People & the Planet

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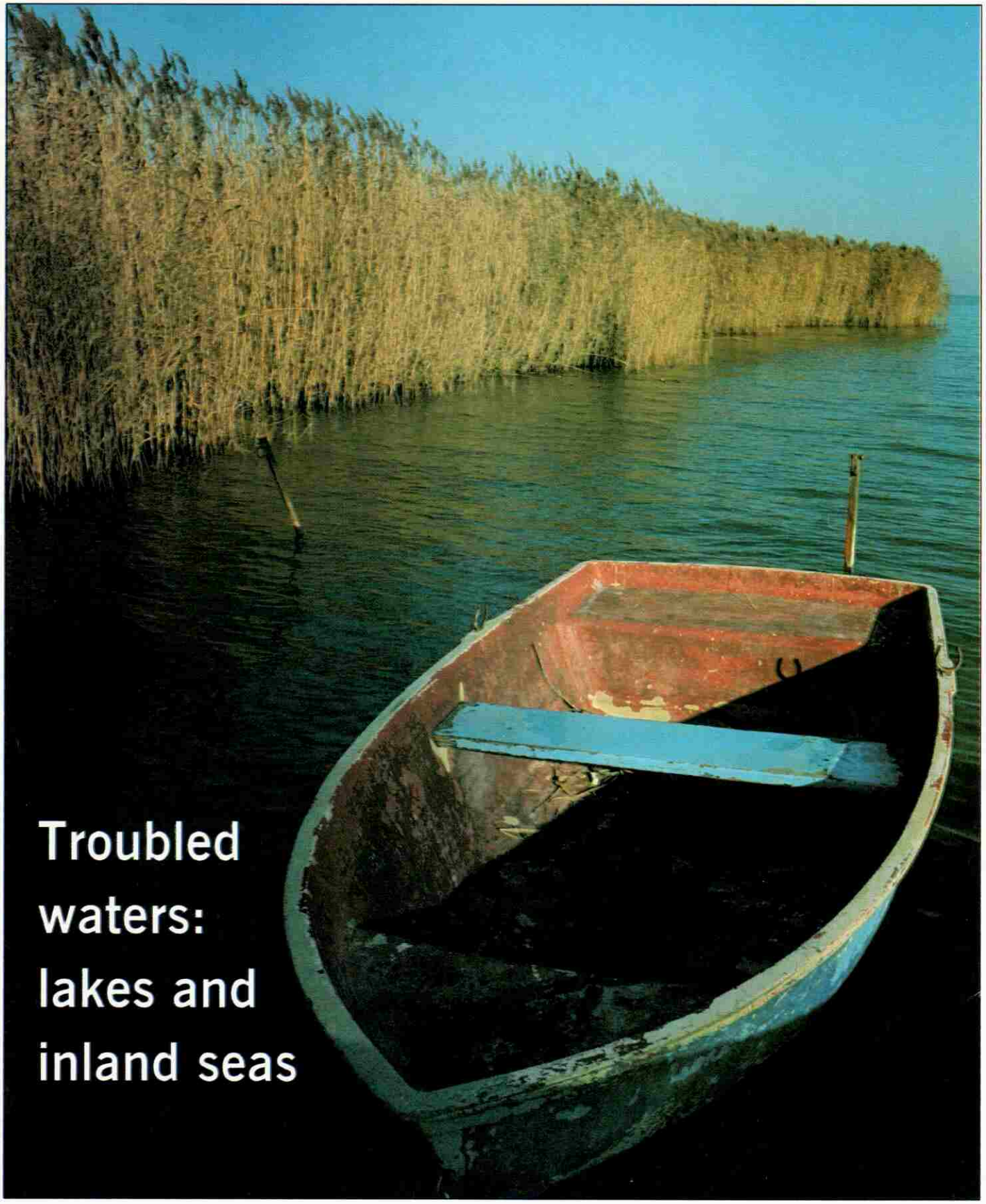

Troubled waters: lakes and inland seas

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Front cover: *Hungary's Lake Balaton, the largest in Central Europe. Its clean-up is the object of national and international efforts (see article on page 30). Photograph by Támas Révesz.*

Left: *Girl helping fishermen bring in a meagre catch, Cambodia.*

■ **On the eve of the Beijing Women's Conference, our next issue will report from around the world on remarkable examples of how women are banding together to bring about social change.**

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People & the Planet

Troubled waters

While world attention is drawn from time to time to the plight of individual inland seas or lakes, little systematic attention has been paid to these most precious and vulnerable waters and the people who depend upon them. It is for this reason that we have attempted to look more widely at what is happening. Wherever we looked the story was disturbing. Everywhere, poor land use, inadequate planning and short-sighted actions for short-term gain has speeded the process of destruction. Only here and there has the job of cleaning up made headway.

In some cases, as with Lake Malawi, population pressures are critical. With 70 per cent of its 10 million people reliant on protein from the lake, the demands on the country's limited fish stocks are enormous. Yet many of the surrounding hills have been stripped bare for human settlements and for agriculture, leading to sedimentation and pollution. A doubling of numbers in the next 20 years will not help matters.

However, in many cases, it is human folly rather than human numbers which is the chief cause of concern. The case of Lake Ichkeul, in Tunisia, cited by Anne Platt in her opening article, is a case in point. Here, planners have proposed diverting the waters of the lake for other uses, threatening its undervalued fisheries and its wildlife, and the lives of all those who depend on them. They should take note from the terrible story that Don Hinrichsen tells from the salinated desert that was once the Aral Sea.

It is not just the loss of one of the world's greatest lakes and its fisheries that matters. It is the whole inter-related ecological and human catastrophe which now threatens the survival of a nation. Hinrichsen's account of a population poisoned by a polluted environment is shocking. It serves as a warning to all who seek to treat water as just another commodity.

John Rowley

People & the Planet **extends its sympathy to the family of Jonathan Zeitlyn, who was tragically killed in an accident while taking photographs of Lake Malombe for this issue of the magazine. Jonathan's latest book,** ***Appropriate Media for Training and Development,*** **is available from University Press, PO Box 261, Dhaka 1000, Bangladesh, price Tk. 250.**

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NEWS FILE

Another 'Second India'

In thinking about the possible doubling of India's population in the 21st Century, one might profitably revisit the "Second India" study, an attempt made in 1970 to foresee what would happen if India's population doubled, as has now happened, *writes Robert Repetto, Vice President and Senior Economist at the World Resources Institute (WRI).*

What was unforeseen in 1970 was not urban growth, but growth in urban poverty. In 1987-88, 40 per cent of city households could not afford to buy enough calories for adequate nutrition – the most basic definition of poverty. The *percentage* of city dwellers who are poor fell over the past 20 years, but their numbers grew from 50 to 84 million; for the first time, the fraction of the population below the poverty line is higher in cities than in the countryside.

In the 23 largest cities, a quarter of the inhabitants live in squatter settlements, often on floodplains or near heavily polluted industrial sites. Very few have sewers, drains or garbage collection – ideal conditions for spreading contagious diseases.

Progress has been made, notably in providing safe drinking water, but rivers near squatter settlements, still widely used for bathing and washing, are heavily polluted by human and industrial wastes, as are shallow aquifers underlying cities, from which many households draw well-water.

India has made a concerted effort to improve education and health, but females, low-income households, and disadvantaged communities are disproportionately left out.

With a population of 900 million and hundreds of millions still to be added, India faces an enormous development challenge. Population growth has made it harder to reduce underemployment, raise educational levels and environmental quality, or provide infrastructure and basic services.

The key to success is to create mechanisms – be they market incentives, community organizations, or other means of governance – for bringing individuals' interests into line with those of the broader community.

■The "Second India" Revisited: Population, Poverty, and Environmental Stress over Two Decades, *(WRI 1994), is based on collaborative research with a group of Indian Scholars.*

Carbon taxes

The European Council of Environment Ministers' meeting in December marked a turning point in European efforts to address the threat of climate change, according to a pan-European report published by the Royal Institute of International Affairs (RIIA).

Despite a last minute attempt by Germany to get agreement on proposals for the European Carbon tax, the Council failed to reach agreement on any significant tax measures and must start to focus on alternative strategies.

The authors insist that achieving Europe's international commitment to stabilize CO_2 emissions is of critical importance both for Europe and for the global process established by the Rio Climate Convention. But instead of trying to harmonize policies in each member state, the report concludes, Europe should establish a legal basis for emissions quotas, based on existing national targets, with penalties for failing to achieve the agreed quotas and incentives for doing better.

Launching the report *Emerging Policies for European Energy* at the conference, the head of RIIA's Energy and Environment Programme, Dr Michael Grubb, said that the refusal to consider this option so far "calls into question whether Member States are serious about their commitments, and whether the European Commission is serious about subsidiarity."

But Dr Grubb, citing recent remarks by the new Spanish director of Europe's Environment Agency, said support for the ideas proposed in their study is growing. He said that failure of the carbon tax and other proposals for harmonized policies would leave Europe with no alternative if it was to meet its international environmental obligations.

■ *Implementing the European CO2 Commitment: A Joint Policy Proposal, £7.50, distributed exclusively by The Brookings Institution in Washington DC, tel: +1 202 797 6258. Or contact Jane Chapman at the RIIA's Energy and Environmental Programme, tel: +44 171 957 5711, fax: 957 5710, email: eepriia@gn.apc.org.*

Genebanks

An agreement was signed in Washington in late October 1994 to place some of the world's most important collections of plant genetic resources – so called 'genebanks', under the auspices of the United Nations Food and Agriculture Organization (FAO), *writes John Madeley.*

The collections are housed in 12 international agricultural research centres that are part of a network that is funded by the Consultative Group on International Agricultural Research (CGIAR). They consist of over half a million different samples of plants which are vital for breeding crops of the future, including 80,000 rice samples at the International Rice Research Institute in the Philippines, and 35,000 samples at the International Maize and Wheat Improvement Centre in Mexico.

Following the signing of the Convention on Biological Diversity at the Earth Summit in Rio in 1992, there has been confusion about the legal status of the genebanks. Countries that donate samples to the genebanks feared they might not have benefitted from any breeding improvement to their samples. The new agreement legally

MICHAEL MACINTYRE/HUTCHINSON LIBRARY

brings the genebanks under the convention and puts donors in a position where they could benefit. This is more likely to make them freely available for crop breeding.

The agreement allows the 12 research centres to become legal trustees of the collections they house. CGIAR chairman, Mr Ismail Serageldin, said at the signing of the agreement that the collections were "invaluable in the application of science for the benefit of the world's poor."

But the agreement could do little to improve the position of developing countries with regard to patents on seeds and plants. Following the outcome of the Uruguay Round of trade talks, there is concern that transnational corporations will claim patents on seeds they have developed, but which have been developed by farmers over many centuries. Indian farmers in particular, have expressed concern over this.

Asian Cities

While the growth of Asian economies is setting a rapid pace, environmental problems are escalating. That is the message which emerges from the World Congress on the Environment, a follow-up to the 1992 Earth Summit in Rio de Janeiro, held in Hong Kong in November.

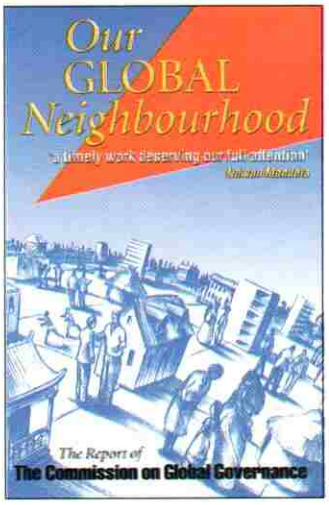
Five out of the seven of the worlds's most polluted cities are in Asia, delegates heard. According to the statisticians, Asia's population will double in the next 40 years, the number of cars will double in the next seven and energy demands will double every 12 years. "Exploding urban situations" were a major hazard, said Dr Wally N'Dow, UN Assistant Secretary-General, citing the catastrophes of Rwanda and Bosnia, where millions of people migrated to cities unable to cope with them.

Hong Kong Independent legislator Christine Loh Kung-wai said that one of the most exciting aspects of the Congress was the opportunity to establish new links with mainland Chinese authorities, which were represented in large numbers.

Global neighbours

"The principles of sovereignty and non-intervention must be adapted in ways that recognize the need to balance the rights of states with the rights of people, and the interests of nations with the interests of the global neighbourhood."

That is the central message of Commission on Global Governance which reported in February. The Commission was set up in 1992 at the instigation of former West German Chancellor Willy Brandt. It is headed by Ingvar Carlsson, Prime Minister of Sweden and Shridath Ramphal, former Commonwealth Secretary General.



The report deals with the issues of security, economic interdependence, the United Nations and the rule of law.

On security the report says that "unprecedented increases in human activity and human numbers have reached the point where their impacts impinge on the basic conditions on which life depends. Action should be taken now to control these activities and keep population growth within acceptable limits so that planetary security is not endangered."

It wants to see the UN Charter amended to allow the Security Council to permit humanitarian intervention within states when the security of people is extensively endangered.

The Commission proposes that an Economic Security Council should be formed to replace existing bodies such as ECOSOC and UNCTAD and provide a long-term policy framework for sustainable development. This would be accompanied by reform of other UN institutions including the Security Council, the Trusteeship Council and the General Assembly.

It also wants to see a strengthening of international law and the International Court of Justice.

■ *The full report of the Commission, Our Global Neighbourhood, is published by Oxford University Press at £6.99.*

Banks going green

The number of banks throughout the world involved in regularly environment-related investment and lending is expected to nearly triple over the next 15 years.

According to the first global survey on banking and the environment, sponsored by the United Nations Environment Programme (UNEP) and Salomon Inc. of New York, European banks are ahead of their North American counterparts in pursuing environmental-related investment and lending opportunities.

The survey was completed by 90 of the 177 investment and commercial banks asked to participate. Among key findings:

■31 per cent of respondents said they loan or invest in environment-related firms today; 88 per cent said they expect to do so within 15 years;

■nearly half of all respondents do not monitor or evaluate environmental risks after funding is committed;

■all respondents predict environmental issues will receive more attention and become increasingly integrated with core business activities over the next 15 years.

Prize winners

Dr M S Swaminathan of India and Paul and Anne Ehrlich of the United States have received the 1994 United Nations Environment Programme (UNEP) Sasakawa Environment Prize for their lifelong work dedicated to the production and management of the environment.

Dr Swaminathan, the Director of the Centre for Research on Sustainable Agricultural and Rural Development, based in Madras, India, has for the past 40 years played a pivotal role in the conservation of biological diversity. As one of the world's leading agricultural scientists, he has played a catalytic role in his country's green revolution and in agricultural research and development.

Because of his emphasis on both conservation and the use of natural resources for human welfare, Dr Swaminathan is widely known as the father of the economic ecology movement. His research on the conservation of wild relatives of the potato, wheat and rice led to India developing a strong national food security system.

The Ehrlichs, based at Stanford University in California, have been leading authorities on the issue of population and the environment.

ICPD summary

The 1994 Cairo International Conference on Population and Development established the universal right to sexual and reproductive health. Family Care International has now produced a report, ***Action for the 21st Century – Reproductive Health and Rights for All***, which summarizes the ICPD recommendations.

■ *For copies contact, Publications Dept, FCI, 588 Broadway, Suite 503, New York, NY 10012, USA. Tel: +1 212 941 5300, Fax: 212 941 5563.*

JEREMY HAMMAND/IPPF

Reversing our path to destruction

Inland seas and lakes have nurtured life for thousands of years and have supported a broad diversity of plants, fish and animals. Now, we are killing these precious resources and will kill ourselves unless urgent action is taken, writes *Anne Platt.*

From early times human civilizations have tended to cluster around inland waters for food security; access to transport routes and fisheries; water supplies for drinking, agriculture and industry; beaches for tourism, and moderate maritime climates.

But human communities have tried also to manipulate and control inland water resources that their existence and nurturing depends on. Societies in all climates have constructed dams to retain valuable water and fought to stake ownership claims on this scarce commodity. Hydroelectric dams have been built on lakes and rivers to generate power for industrial development, while diversionary channels and canals have carried water from riverbeds to farms and cities. Each of these activities has taken its toll on the quality and quantity of water ecosystems.

While there are many natural causes for declines in water quality, such as algae, red tides, exotic species, and variable rainfall, human actions and poor development strategies have wreaked the greatest havoc. Also, they have accelerated the pace of decline of inland seas and lakes to a point that threatens to destroy life on land and sea.

Poor land use practices, inadequate planning, and focus on short-term economic gains are the chief causes of decline in inland seas and lakes. Land-based activities such as mining, timber and forestry, and farming have exacerbated pollution and run-off. At the same time, they have decreased the capacity of seas and lakes to absorb wastes and to process and cleanse themselves. As more and more polluted water is discharged from factories, farms, and cities, inland seas and lakes are at a greater disadvantage to handle the increasing volume of deadly wastes.

Inland seas and lakes are closely linked to the daily life of the surrounding population. But, they are also sensitive to environmental changes – especially human-caused degradation. The ties between life and water are perhaps closest on the shores of seas and lakes but it is here that the competing interests pull hardest. Faced with mounting losses, we must exercise the

DAVID BOWDEN/PICTURE LIBRARY
JIM HOLMES/PANOS PICTURES

Left: *A floating house on the Tonle Sap.*
Below: *A flooded forest during the monsoon season, Kampong Chhnang, Tonle Sap.*

foresight to advance protective action. However, sometimes disgust and will power are not enough to protect the remaining ecological and economic values of our seas and lakes. The effort requires a financial commitment as well.

For example, in 1925, Nicaraguan officials decided that treatment facilities for human wastes from Managua's 20,000 people were too expensive. Instead of investing in the infrastructure, the wastes were drained directly into Lake Managua. Now this capital city has more than one million people, 70 per cent of whom use toilets that send waste to lake. As a result, the lake is an immense latrine and almost all fisheries, birds, and plants have either died, migrated elsewhere, or suffered illnesses from an overdose of toxic waste.

Lakes in other parts of the world are also affected by varied sources of pollution. In some Chinese lakes, 70 per cent of water consists of household sewage and industrial effluent. In Canada, Scandinavia, and parts of Europe and the United.States., acid rain has altered chemistry of freshwater lakes and killed fish and aquatic life. To address these issues, governments were forced to reduce and clean-up fossil fuel burning, and in some cases, to calcify lake beds.

Tonle Sap, or Great Lake, in Cambodia, is threatened by siltation from logging and deforestation. In the 1970s, Cambodia had 70 per cent forest coverage; now only 30 per cent remains, resulting in erosion of soils and clogging of the lake and waterways. Further damage has been caused by efforts to capture the monsoon waters that flow up from river banks, swelling the lake's by almost five times once a year. Man-made structures have impaired breeding of fisheries, disrupted natural flooding cycle, and devastated rice crops that thrive in nutrient-rich mud, adding to the damage from siltation.

Lake Ichkeul in Tunisia is one of the last great freshwater lakes in North Africa. It is now threatened by plans to divert the rivers feeding the lake to provide water for Tunis and other areas. Lake Ichkeul is linked to the Mediterranean Sea, so stopping the freshwater flow would turn the lake into a salty reservoir. Currently, fisheries are worth $1 million yearly and a majority of the catch is exported. Several thousand landless farmers graze cattle in the marshlands around the lake and share it with a quarter million waterfowl, otter and North American buffalo. Lake Ichkeul has received international attention and is listed on the Ramsar Convention, World Heritage Convention, and the UNESCO network of biosphere reserves. But if plans to divert water go through, thousands of fishers and farmers will be displaced. So far, the lake has been preserved.

Ecological and economic losses from marine and freshwater fisheries worldwide have mounted steadily since the 1950s. According to Les Kaufman, chief scientist at the New England Aquarium in Boston, Massachusetts, "more than one in five freshwater fishes may be threatened or endangered."

In the Baltic Sea, cod fisheries have declined from their peak of 440,000 tons in 1984. The limit for 1993 was set at 40,000 tons, one-tenth the peak level and from April through July, all cod fishing was prohibited to allow cod to spawn and reproduce as much as possible.

In the Black Sea, fisheries have declined so much that the estimated 2 million people who make their living from fishing and fishery-related industries, are at risk of losing their jobs. Total losses of fish are estimated at 5 million metric tons since the early 1970s, from overfishing and eutrophication. Dolphin, sturgeon, anchovy, and mackerel are suffering from overfishing and polluted waters. Annually, direct economic losses have mounted to more than $200 million in the fishing industry. The costs of related industries could push the figure over $1 billion each year.

High levels of organochlorines, such as PCBs, DDT, and dioxin, in marine mammals sampled from the Baltic Sea, the US Great Lakes, and even the Bering Sea highlight the need to reduce use of these and other toxins. This class of chemicals causes irreversible damage in the reproductive and endocrine (hormone) systems of species and has ▶

Goodbye to the black pearls of the Caspian?

A majority of the major seas are only partially enclosed, which gives them at least some – albeit very slow – opportunity to recover. The Caspian Sea is entirely enclosed and its lifelines have been more manipulated, and strangled, than any of the other seas. As a consequence, it has more limited absorptive capacity. Yet, it has had to serve as a receptacle for massive amounts of waste. And that collision of interests has produced an outcome of ironic and tragic simplicity: the Caspian's most valued product – its caviar – has been virtually wiped out.

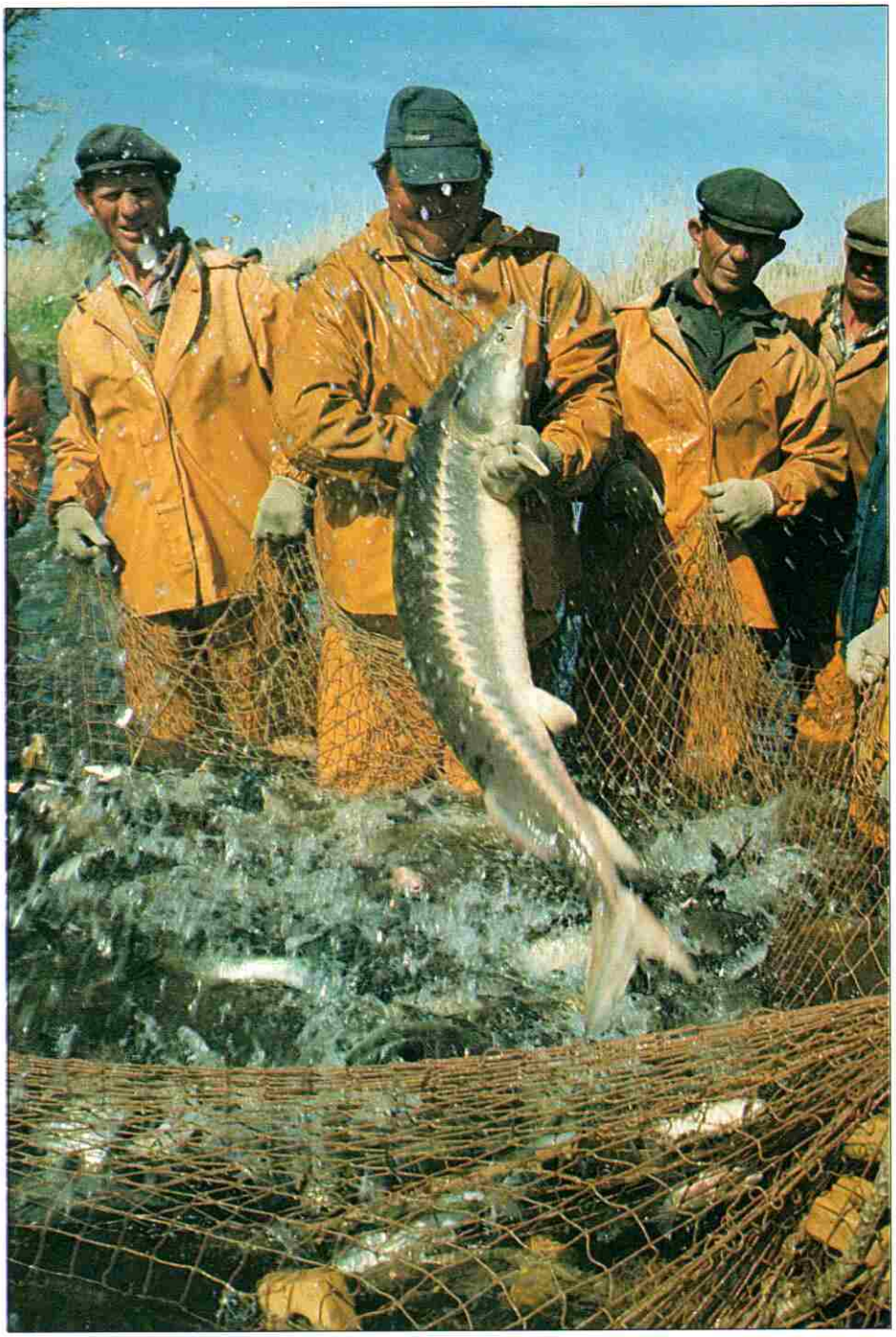
Perhaps nowhere else is the human bent for controlling and manipulating – and its effects on nature – so pronounced as in the Caspian. Over the centuries, powerful rivals have fought to control this sea's strategic rivers and ports. In the late 19th century, an oil boom in Azerbaijan gave birth to a major industrial centre on the Caspian's western shore, in the area around Baku; during World War II, the Soviet war effort was powered almost entirely by Baku's oil. And since the breakup of the Soviet Union, there have been ongoing discussions among Azerbaijan, Russia, Kazakhstan, Turkmenistan and Iran, as well as Western oil companies, about access to oil supplies.

The northern part of the Caspian basin is valued for its agricultural resources and hydroelectric power. It produces one-fifth of the former Soviet countries' agricultural total crop yield, and one-third of their industrial output. In the last 40 years, a string of dams and hydropower plants have been built along the Volga river, to supply electric power to the industries and to irrigate the crops. These uses have lowered water levels enough to severely impair the Volga's capacity to dilute waste and run-off, upsetting the natural balances of salinity, temperature, and oxygen in water downstream.

The Volga is also the Caspian's major source of contamination. In 1989, the Caspian received 40 million tons of polluted wastewater. Draining the area from north of Leningrad to south of Tehran, it was forced to accept more than one-fourth of all the wastewater disgorged by Russia. From petrochemical factories alone, some 67,000 tons of wastes flush into the sea each year.

As a result, fisheries have collapsed. The catches of pike and perch, for example, have dropped by 96 per cent in the past three decades. But the biggest shock to this region has been the fate of its caviar – or sturgeon's eggs. The Caspian Sea used to produce 90 per cent of world's supply of this prized delicacy, still known as the "black pearls of the Caspian." But the number of sturgeon returning to the Caspian from the Volga River has declined drastically, because of obstructed migratory paths, overfishing, and pollution.

In the 1970s, it was not uncommon to find a specimen that was 60 years old and weighed 900 pounds. Today, an estimated 90 per cent of the sea's sturgeons are killed before they are mature enough to reproduce – and the typical adult is just 18 years old and weighs 77 pounds. In the Iranian Sefid Rud River delta in the southern Caspian, commercial catch of sturgeon dropped from 6,700 tons in 1961 to less than one-half ton in 1993. ■



BOMFORD & BORRILL/SURVIVAL ANGLIA

caused declines in populations of seals, herring, cod, and birds.

Recorded outbreaks of shellfish poisoning have increased in tandem with increases in pollution and habitat degradation. These outbreaks are no longer limited to the tropics or hot- spot areas: they are becoming more common all over the globe. When the outbreaks occur in areas ill-equipped to handle medical emergencies or in areas where a large percentage of the population depend on fisheries for food, the costs are devastating.

Rather than attempting to repair the damages and address the root causes of the decline in fisheries (overfishing, habitat destruction, and pollution),

Left: *Fishermen catch sturgeon on the Volga Delta, Caspian Sea.*
Below: *Fishing boats on Lake Manzala, Northern Egypt.*

many governments and development agencies have supported substitution with fish hatcheries and stocking. Fish farming has erupted in Asia, especially along Indian and Chinese coastal areas. In 1954, agricultural farming co-operatives were organized in Indian lake beds. The Indian Government provided subsidies to farmers, but, despite best intentions, farming failed on the seasonally flooded lake beds. Since 1980, fish farming has grown. Now, fish tanks are everywhere and fish farms block the water channels from the catchment area.

Since 1989, the entire coast of China has experienced severe red tides, according to Dr Qi Yucao, president of the Institute for Hydrobiology at Jinan University, Guangzhou, and the director of the Red Tide Programme in China. Red tides are surface to deep water algal blooms that are brownish red or dark green in colour. Red tides occur where there is a high concentration of nutrients and poor water drainage. They can be toxic, depending on the type of algae that ravages the water.

This recent explosion in red tides is linked to a growing aquaculture production. Worldwide, fisheries shortages have created a lucrative market for aquaculture. United Nations Food and Agriculture Organization (FAO) estimates that Asia produced 80 per cent of world's total aquaculture supplies in 1992.

While these trends are alarming, coastal and urban populations are expected to soar in the coming years. According to demographic models by the United Nations, most population growth after 1990 in the Mediterranean region will occur along the coasts of North Africa. From Turkey to Morocco, coastal urban populations along the southern Mediterranean are expected to increase by three-fold over 40 years, from 30 million people in 1985 to 104 million people in 2025. In the South China Sea region, there are currently 600 million people. This is expected to increase by 180 million in the next 15 years.

Typically, people who suffer the most from the decline of lakes and seas are the poorest and those who have the least options, in terms of food, jobs, and development opportunities, available to them. In the mid-1980s, water control projects had removed nearly two million acres from inland fisheries in Bangladesh, forcing traditional fishers to look elsewhere for food and jobs.

Often, the value of fish that the poor consume is not even calculated in cost-benefit analyses. Using market projections, the harvest from stocking programmes is often calculated as

being more than enough to compensate for the losses. But invariably, it is the leaseholders and fish merchants, not the poor, who reap the profits.

Lake Chilika, in Orissa, India, is a prime example of how development policies often hurt the poor the most. Proposals have evolved to build several 50-hectare prawn ponds in Lake Chilika. Basically, private companies would move in on traditional fishing grounds to cultivate and to harvest vast amounts of prawn for commercial export. Traditional fishers fear losing their livelihoods. As a Chilikan fisher said, "prawns and misery are intertwined."

Despite government support, public resistance has been strong and vital to changing the course of action. Chilika Bachao Andolan (Movement to Protect Chilika) represents farmers, traders, and students, but the leadership remains in hands of illiterate, low-caste fishers. They have called for a halt to these plans, at least until an environmental impact assessment is conducted.

Lake Manzala, Egypt, is a symbol of losses and a symbol of the country's resolve to preserve the environment. This coastal lake is adjacent to the Suez Canal and drains into the Mediterranean Sea. During the 1970s, development and money was directed toward modernizing Port Said, at the cost of polluting the lake. As a result, Egypt's fishing fleets, which were once the world's largest and most productive, have now shrunk as fishers come up empty-handed from Manzala's waters. People are forced to stop practices that are harmful to the lake including fry trapping, building fish corrals, and placing seine nets across canal mouths.

But now the Government is using engineered wetlands as a low- cost, pollution abatement technology to clean up the lake. Building a wetland at the mouth of the lake's dirtiest inflowing canal – Bahr El Baqr which brings heavy metals, sewage, and fertilizers from Cairo – will amount to about one-fiftieth the cost it would take to treat and clean the lake with higher-tech devices. The project will establish 280 hectares of bullrush, cattail, chara, and water hyacinth to filter and deactivate pollutants. It will also establish a model that other cost-conscious countries can follow to clean up degraded water bodies.

Worldwide, the shortage of fresh water and pollution of water are two important limiting factors in economic and social development. If we continue to damage and to exploit water resources, we will slowly (rapidly in some areas) kill ourselves and the ecosystems we depend on. We have already altered the physical chemistry of the Black Sea; disrupted the predator-prey relationships in Lake Victoria; turned the Aral Sea into a windblown graveyard of ships; and clogged Tonle Sap with silt and sediments. Now, we must own up to our failed policies and reverse our course – before it is too late. ■

Anne Platt is a staff researcher at the Worldwatch Institute, Washington DC.

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FRED MAYER/MAGNUM

Requiem for a dying sea

The drying-up of the once-great Aral Sea – until recent times the world's fourth largest lake – is well known. But the associated human tragedy affecting the health and survival of a whole nation has been overlooked. ***Don Hinrichsen*** **travelled through the region to research this special report for** ***People & the Planet*****.**

Gazing out over what used to be the Aral Sea's southern shore from a high ridge on the edge of Muynak, Jasmurad Kenesbay pulls up the collar on his threadbare overcoat and bends his head into a fierce December wind. "I don't think I will ever fish again," he shrugs. "As the sea dies, so does this village. Our entire economy has been destroyed and so have our lives."

The sight from this perch, known as "*Tigrovi Hvost*" (Tiger's Back), is sobering. As far as the eye can see, the former seabed is now a salt pan desert, a virtual graveyard littered with the rusting remains of fishing trawlers and barges and the bleached bones of cattle, which died from eating salt-poisoned vegetation.

The fate of Muynak is closely tied to the fate of the Aral Sea itself. In 1950, Muynak was an island in the generous delta of the Amu Darya River, one of two major river systems that replenished the Aral Sea with some 50 km^3 of freshwater a year. By 1962, four years after huge canals began to siphon off water from the river to irrigate cotton fields and rice paddies in Uzbekistan, Turkmenistan and Tajikistan, Muynak became a peninsula, shaped like a crooked finger pointing west. Within a decade (1970), the sea was 10 kilometres away from the former seaport. In 1980, the sea had receded 40 kilometres and at the beginning of 1995 it was 70 kilometres away across a trackless wasteland.

Until the late 1960s, more than 3,000 fishermen worked the rich waters around Muynak, hauling in some 22 different commercial species of fish, including carp, bream, pike-perch, roach, barbel and a local variety of sturgeon.

"In 1957, our last record year for fishing," recalls Kenesbay, "Muynak fishing collectives brought in nearly 26,000 tons of fish, accounting for over half of the total catch for the entire sea."

That same year, Muynak produced 1.1 million farmed muskrat skins which were sold to furriers and made into fashionable coats and hats. "We had a good economy then," says Kenesbay. "I belonged to one of 12 state farms which specialized in fishing. We were hauling in more than

Left: *Stranded boats on the dried-up Aral Sea.*
Below: *Jasmurad Kenesbay sits stiffly for the camera in Muynak, a community facing extinction.*

enough fish, and everyone had money to spend."

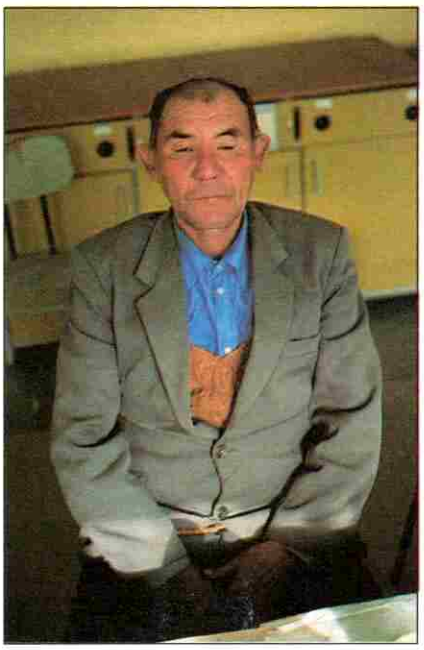
That soon changed. "All commercial fishing ceased in the Aral Sea by 1982," points out Kenesbay. "It was already too far away and too saline to sustain fisheries."

With irrigation needs increasing steadily, the sea continued to contract year after year as more water was diverted from the two river systems which fed it – the Amu Darya in the south and the Syr Darya in the north. By 1995, the amount of water supplied by these two rivers hardly amounted to a trickle, a mere 2-3 km^3. Between 1960 and 1995, its surface area shrank by more than half, from 64,500 km^2 to less than 30,000 km^2. At the same time, it dropped 19 meters and its salinity tripled. More than 50 lakes in the Amu Darya delta dried up and its wetlands shrank from 550,000 hectares to less than 20,000 hectares. Once the world's fourth largest lake, the Aral Sea has now lost so much of its water volume that what little remains is contained in three separate highly saline lakes.

Today, there are no more than 250 fishermen in the entire district around Muynak. They drive to work in beat-up jeeps, instead of boats. Of the two dozen species taken in the Sea and the Amu Darya estuary three decades ago, only four species survive in the Delta's polluted waters and its few remaining lakes. No more than 3,000 tons of fish – consisting mostly of an oily-fleshed type of carp – were caught in 1994. Virtually nothing can be harvested from the sea itself. And the muskrat farms have all but disappeared, along with the delta's wetlands.

Muynak's fish cannery continued to operate, processing frozen fish brought in at great cost from the Baltic and North Atlantic. With the breakup of the Soviet Union, the newly independent Baltic States refused to ship more Baltic fish to Muynak. Authorities tried to buy fish from the Caspian Sea and as far away as the Pacific, with little success. Although the cannery is still technically open, it produced only 4 million cans in 1993, out of a total capacity of 27 million. In 1994 it operated for only a few days.

The collapse of fisheries was only the first ecological link to come apart. The sea used to regulate climate in the region, buffering the cold winds that roared out of Siberia in the winter, and acting as a huge air conditioner in the summer. With the demise of the sea, this climate modifying function has been lost. The climate around the sea has changed, becoming more continental, with shorter, hotter, rainless summers and longer, colder, snowless winters. The growing season has been reduced to an average of 170 days, fewer than the 200 frost-free days needed to grow cotton.



The Karakum and Kyzylkum Deserts now meet on the Aral's former seabed. The three million hectares of the seabed exposed to weathering has increased soil salinization and desertification around the sea. Dust storms scour the seabed and neighbouring areas, scattering salt and pesticide residues over the whole region. By 1993, some 75 million metric tons of dust and salt were being dumped on surrounding lands. Salts from the Aral Sea have even been traced as far away as Belarus, over 1,000 kilometres to the northwest.

"My own state farm converted from fishing to growing vegetables and raising cattle," notes Kenesbay. By the mid-1980s, the land around Muynak was already degraded. Decades of poor irrigation practices had waterlogged or salinized formerly fertile soils. "With our equipment broken down and spare parts unobtainable, and no money for soil rehabilitation, we haven't had much success at agriculture," he adds.

As of December 1994, Kenesbay had not received a pay cheque since May. And even if he had, there is no longer a bank in Muynak capable of cashing it. As the economy has collapsed, so has people's faith in state institutions. What little money people have they hide under mattresses or bury in backyard gardens. Kenesbay and thousands of others like him throughout the region now live hand to mouth, in barter economies more reminiscent of the Middle Ages than the 20th century.

Muynak and the rest of the Amu Darya Delta is one of the most badly affected areas in the entire Aral Sea region. This area is part of the Karakalpakstan Republic, which sprawls around the southern portion of the sea, extending southward from Muynak along the Amu Darya River, its boundary ending just north of the ancient Uzbek city of Khiva. An autonomous republic now incorporated into Uzbekistan, Karakalpakia has over 1.2 million inhabitants which are ethnically and culturally distinct from Uzbeks.

"You must remember, the Aral Sea is not only an ecological catastrophe," points out former communist party official Abdikirim Tleyov. "It is above all a human one."

Currently working as the Director of the Muynak Biological Station, set up some years ago with German aid money to monitor the sea's decline, Tleyov is fighting to keep the Station open and his small staff employed.

The future looks bleak. Recently, equipment donated by the Germans failed to arrive in Muynak. "We found out later the computers and monitoring equipment intended for our use had been confiscated in Tashkent by officials in the environment ministry," fumes Tleyov. "We got nothing at all."

Tleyov is convinced that the new Uzbek government is not interested in the problems of Karakalpakia. "The government is corrupt," insists Tleyov, ▶

D. HINRICHSEN

banging his meaty fists on the table. "They want to do everything from Tashkent and ignore our efforts entirely. We can't get money from them for anything."

Uzbekistan, with 22 million people, has the largest population of any of the Central Asian republics. With acute water shortages of its own, it is easy to see how the Uzbek government can overlook the problems of Karakalpakia, squatting at the end of the pollution pipeline in the Amu Darya Delta.

But Uzbekistan's neglect of the needs of the Karakalpak people has translated into a human tragedy of mounting proportions. With the desiccation of the Aral Sea has come health problems on an unprecedented scale. Dr Oral Ataniyazova, a gynaecologist and obstetrician, based in Nukus, the capital of Karakalpakstan, thinks that most of the region's illnesses are environmentally induced. "We have high levels of heavy metals, salts and other toxic substances in our drinking water supplies, and the bulk of our vegetables are contaminated with organochlorine pesticides, such as DDT which is still used here in great quantities."

As a consequence, claims Dr Ataniyazova, "our people are dying like flies. Karakalpakia has the highest levels of maternal and infant mortality in the former Soviet Union." As of 1994, maternal deaths were 120 per 100,000 live births, and infant mortality was 60 per 1,000 live births.

According to a region-wide health survey carried out by Dr Ataniyazova over the last few years, this is only the surface of a problem that cuts very deep. Her findings are disturbing. During the past 10-15 years, kidney and liver diseases, especially cancers, have increased 30-40 fold, arthritic diseases by 60-fold and chronic bronchitis by 30-fold. Also, infectious diseases such as typhoid and hepatitis A have increased sharply.

The chronic deterioration of women's health in the republic is cause for grave concern. "Over 20 per cent of all our young women, aged 13-19, have kidney diseases," claims Dr Ataniyazova, who is also Director of the republic's only Centre for Human Reproduction and Family Planning. "Another 23 per cent suffer from thyroid dysfunctions. And many women have high levels of lead, zinc and strontium in their blood." Apparently, the high strontium levels are due to the testing of atomic and hydrogen bombs in the region during the 1950s and 1960s.

In addition, over 80 per cent of all women in Karakalpakia suffer from anaemia. "Nearly all of them haemorrhage while giving birth," points out Dr Ataniyazova. "One reason why the maternal mortality rate is so high."

With all the ecological and economic problems afflicting Muynak, perhaps it is not surprisingly that the town is also a health disaster. According to the Institute of Clinical and Experimental Medicine in Nukus, nearly 70 per cent of the town's remaining 2,000 residents have "pre-cancerous conditions," with cancer of the oesophagus reaching epidemic proportions. Its annual death rate is said to be around 100 per 1,000 people. If true, and if nothing is done, the entire population could be wiped out in one generation.

"We simply don't have the facilities or personnel to diagnose and treat many of these diseases and chronic conditions," notes Dr Ataniyazova. In the entire republic, for example, there is only one children's hospital, in Nukus. This 400-bed facility has only ten working incubators and not enough blood stocks to keep up with demand.

"We don't have the necessary equipment capable of measuring for trace

D. HINRICHSEN

A desperate need for reproductive health services in Karakalpakia

The population growth rate in the Karakalpakstan Republic, which is part of Uzbekistan, remains rather high, around 3 per cent per annum. As expected, the average family size is large, 5.5 children per couple. The remarkable thing about these statistics is that high birth rates continue despite the fact that the contraceptive prevalence rate is also high: around 50 per cent of all women of reproductive age use contraception. But choices are limited to the IUD – there simply are no other forms of contraception available. And backup services are restricted to main towns and cities.

"The reason for both high contraceptive prevalence rates and high birth rates is that most of our women marry by the age of 18 and continue to have children until their late 30s," explains *Dr Oral Ataniyazova*, a gynaecologist and Director of the Karakalpak Centre of Human Reproduction and Family Planning. "We desperately need to introduce family life education in our schools, but we have no money for such programmes at the moment."

According to Dr Ataniyazova, most of the women in Karakalpakstan would favour sterilization after the age of 35. "Few of them want children after that age, but unfortunately, we simply don't have the services available yet." She hopes to be able to set up a network of maternal and child health care services through her recently formed NGO, the Karakalpak Centre of Human Reproduction and Family Planning. But funds are in short supply.

"What we really need," explains Dr Ataniyazova, "is a good paediatric hospital catering to women's needs." Because of the poor health of mothers, an increasing number of babies die from hypoxia. And 21 babies out of every 1,000 live births are born with birth defects, including Down's Syndrome.

"If we can get some support to expand our MCH and family planning centres, we could begin to make a difference in growth rates and improve the health of our women and children," she says. ■

Left: *Pollution in Karakalpakia affects the health of women and children.*
Below: *Death rates in Muynak are among the highest ever recorded.*

A. SHESTAKOV

chemicals and other toxins in the human body, such as DDT, PCBs or dioxins," she explains. "We really need to be able to monitor and study the combined effects of multiple chemical contamination on the human body." Unfortunately, appeals to Tashkent for assistance have fallen on deaf ears. "Uzbek authorities are not interested in our problems," she concludes.

Meanwhile, the land and its people continue to wither away. By the end of the 1980s, more than three billion m^3 of drainage water contaminated with agricultural chemicals from Uzbek and Turkmen fields, together with untreated industrial and municipal wastes, were being dumped in the Amu Darya River each year. Much of it ended up in the delta, where it poisoned aquatic ecosystems and contaminated drinking water supplies.

But the real killer of the land is salt. Thanks to decades of indiscriminate irrigation that paid more attention to centrally-planned quotas than the state of the environment, nearly the whole of Karakalpakia is either salinized or waterlogged. Driving through the heart of the republic along the Amu Darya River, the visitor passes field after field covered with what looks like winter's first light snow. The 'snow' is really salt which has worked its way to the surface, a result of improper drainage of the soils and the use of too much irrigation water. Irrigation efficiencies are said to be no better than 40 or 50 per cent – the rest is lost before it reaches the fields; the water soaks into unlined canals, or is evaporated.

"There is an old Uzbek proverb," explains Usuatdin Matkarimov, Chief of the Karakalpak State Committee for Nature Protection, "which goes like this: 'At the beginning you drink water, at the end you drink poison.' That sums up the plight of Karakalpakia; we're at the wrong end of the watershed."

Although the four Central Asian republics which share the watershed of the Amu Darya River – Uzbekistan, Turkmenistan, Tajikistan and Kyrgyzia – have banded together to better manage the region's limited water resources, few practical solutions have emerged so far. In March 1993, all five of the Aral Sea watershed states (including Kazakhstan) signed a multinational agreement to improve the situation in the Aral Sea Basin. A fund was established to pay for needed restoration efforts, requiring each country to contribute one per cent of its annual GNP. In January 1994 another meeting, this one held in Nukus, reaffirmed their commitment to resolving the crisis. However, with the region's immense political and economic problems taking precedence, the finances needed to put some muscle into the rescue plan have simply not materialized.

Nor are funds likely to be forthcoming. Most of the watershed states are now busy trying to squeeze as much water out of the Amu Darya and Syr Darya Rivers as possible. Ironically, the extra water, they argue, is needed to expand irrigated agriculture (mostly cotton for export), which each of the region's governments sees as a way to improve their faltering economies. Once again, environmental concerns have been shoved aside.

At the end of 1994, the region still had no unified water management strategy, no water pricing policy, no supporting environmental legislation, and no clear ecological objectives. The watershed states can't seem to agree on whether to try to stabilize the sea at its present low level, or attempt to revive the delta's ruined ecology by concentrating on wetland rehabilitation and the resuscitation of its lake system. The one thing they can agree on is the need to conserve water.

Meanwhile, a $200-million programme, co-ordinated by the World Bank's Aral Sea Unit, holds promise for long-term management of the entire watershed. However, authorities in Nukus remain sceptical about any international rescue efforts which must first go through Tashkent. "I've seen many international delegations come through here, but so far, despite the urgency, we haven't seen any funds channelled our way," comments Dr Akmed Hametyllaevich, Director of the Institute of Bioecology in Nukus. "The situation gets more critical by the month. We have perhaps only 10 years left before the sea is beyond hope and the whole region is turned into desert."

There is an even worse prediction. This one made by Dr Oral Ataniyazova. "Since 99 per cent of the Karakalpak nation lives within its boundaries, we may very well be witnessing the death of a nation as the result of human folly." ■

PANOS PICTURES/RON GILING

Lake Victoria: a sick giant

Lake Victoria was 'discovered' in 1858 by the British explorer John Speke, after months of braving dense forests and tropical diseases in his search for the source of the Nile. But now the Lake is in poor health, and the livelihood of the communities round it is threatened. *Nancy Chege,* **of the Worldwatch Institute, explains what has caused the trouble and what can be done to save the Lake.**

If he could see Lake Victoria today, John Speke would probably stare in shock and disbelief. The once clear, life-filled lake is murky, smelly, and choking with algae.

The ecological health of Lake Victoria has been affected profoundly as a result of a rapidly growing population, clearance of natural vegetation along the shores, a booming fish-export industry, the disappearance of several fish species native to the lake, prolific growth of algae, and dumping of untreated effluent by several industries. Much of the damage is vast and irreversible. Traditional lifestyles of lakeshore communities have been disrupted and are crumbling. There is a consensus among scientists that if an accelerated push to save the lake is not made soon, this much-needed body of water will cease to sustain life.

Lake Victoria, shared by Kenya, Tanzania and Uganda, was named after the Queen of England and is the world's largest tropical lake and the second largest freshwater lake. Covering a total of 69,000 km^2, the lake is as large as Ireland, and lies in the Rift Valley of East Africa, a 3,500- mile system of deep cracks in the earth's crust running from the Red Sea south to Mozambique. Although this region of Africa is better known for its large cats and the herds of wildebeests, zebras and giraffes that roam the savannah plains, its most diverse and endangered ecosystems are under water.

Early in the 20th century, a few decades after Speke's 'discovery', the colonialists started to exploit Lake Victoria's watershed. They cleared the surrounding natural vegetation, denuding forests and draining swamps, to plant cash crops, such as tea, coffee and sugar. Over the years, cash crop plantations have grown in size and number. Agricultural chemicals, applied on these plantations are washed into rivers during the rainy season, and end up in the lake, providing nutrients for unwanted, unsightly algal blooms.

The plantations attracted migrant workers who settled in the area. As the population grew and fishing methods advanced, overfishing became a problem and catch sizes began to drop. By

Left: *Clearing water hyacinths on Lake Victoria.*

the 1950s, popular species, such as *ngege (Oreochromis esculentus)*, had diminished so severely that they had become commercially extinct. To remedy the situation, British officials introduced new fish in the lake's waters: the Nile tilapia (*Oreochromis niloticus*) and Nile perch (*Lates niloticus*). The new fish constituted only a minute percentage of the lake's fish biomass, while cichlids (small indigenous species) made up 80 per cent. Up until the late 1970s, the biomass composition of the lake remained relatively constant, but in 1980, a survey of the lake revealed an abrupt and unexpected change: a total reverse in biomass composition. Cichlid numbers had fallen drastically, comprising only 1 per cent of fish weight, while those of the Nile perch had suddenly jumped to constitute 80 per cent.

Cichlids are small bony fish whose mouth parts have evolved to suit their different eating patterns. Some feed on fish eggs, others on insects, while a majority prefer detritus. With the absence of significant fish numbers to feed on detritus, the organic material decays, consuming oxygen as it sinks to the floor. Some areas of the lake, particularly the lowest levels, are depleted of oxygen and are thus uninhabitable.

For decades, ecologists have travelled to Lake Victoria to study cichlids for their explosive evolutionary capabilities. In only some 14,000 years, as many as 400 species of cichlids evolved from 5 species of ancestors, making Lake Victoria one of the most species-diverse lakes in the world. However, the number of cichlid species has now plunged to 200, thanks to the Nile perch. Loss of half the cichlid species has been termed as "the greatest vertebrate mass extinction in recorded history" by Les Kauffman, a chief scientist at Boston University. Commonly referred to as a voracious predator, the perch can grow to a hefty six-foot, 200-pound giant by feeding primarily on the smaller fish.

Local fishermen are working harder and catching less; they are in a predicament (see box). The populations of smaller fish, which traditionally have been their source of livelihood, have been decimated either by larger predators or by overfishing. The big, oily Nile perch, generally referred to as *mbuta* is too far out in the open waters for the little fishing boats, and too big to be caught in the unsophisticated nets.

However, although it is perceived as an ecological disaster by scientists, the introduction of the Nile perch is viewed as an economic booster by successful businessmen and powerful government officials. Hauled by the ton from the open lake by large, commercial boats, the fish are sold to nearby foreign-owned processing plants where they are rapidly cleaned, filleted, boxed and frozen, and sent off to prohibitively expensive restaurants in Nairobi and to the delicacy freezers of stores in the Middle East and Europe. The Nile perch has indeed become a money-spinner. Its hide is used to make belts and purses, while its bladder is sold to English alcohol-makers who use it as a filter and to Orientals for soup stock.

In response to an increased, international demand for the Nile perch and other lake fish, commercial fishing fleets have not only displaced local fishermen but have also stripped many women in lakeside communities from one of their jobs. Processing of fish was traditionally performed by women, but has now been taken over by large filleting plants. The women have resorted to processing fish waste, commonly referred to as *mgongo-wazi*, 'bare-back' in Swahili. The waste, comprised of head, backbone, and tail, is sun-dried ▶

Right: *Scores of flamingoes grace the waters of Lake Nakuru, Kenya.*

and then deep-fried and sold to local people drawn to its low price and nutritional value.

Situated not far from the processing plants is a whole range of industries, varying from textile and leather-tanning to paper mills and breweries. Most of these are in Tanzania and Kenya, and are notorious for discharging untreated effluent. A recent study shows that on a daily basis, Tanzania is responsible for 2 million litres of untreated sewage and industrial waste that flow into the lake. Although Kenya has rather strict pollution laws, these are rarely enforced because the industries have ties with foreign investors and the Government often has a significant stake in the polluting units. Moreover, it is considerably cheaper for the industries to pay an occasional 10,000 shillings fine (US$220) than to install equipment to treat effluent at a cost of US$2 million.

A more recent threat to the lake is the water hyacinth. With the deceptive appearance of a lush, green carpet, the hyacinth is a merciless, free-floating weed, reproducing rapidly and covering any uncovered territory. First noticed in 1989, the weed has already spread like wildfire, and has covered areas in all three countries. It forms a dense mat, blocking sunlight for organisms below, depleting the low concentrations of oxygen and trapping fishing boats and nets of all sizes. The hyacinth is an ideal habitat for snails that cause bilharzia and for snakes. Scientists are desperately trying to control the weed: their most promising approach involves harvesting the hyacinth and using it for compost or for biogas.

The health implications associated with the dilapidated state of the lake are extensive. Dumping untreated sewage in the lake and nearby rivers exposes people to waterborne diseases, such as typhoid, cholera and diarrhoea. As fish prices soar beyond the common man's reach, protein malnutrition maybe a real threat. How ironic this would be, when over 200,000 tons of fish are exported from this region annually. After the carnage in nearby Rwanda in May 1994, certain parts of the lake were considered disaster areas by the Ugandan Government, after thousands of bodies had floated into the lake via the Kagera river. Along the Ugandan-Tanzanian border, people fished out bodies that were not entangled by the hyacinth, to prevent an epidemic. During this crisis, the governments of all three countries were reported to be working closely to monitor the environmental situation.

Although the problems facing Lake Victoria may appear discouragingly complex and colossal, international and domestic efforts are under way to save the lake and curb its deterioration. In 1992, representatives of Kenya, Tanzania and Uganda formed the Lake Victoria Organization to co-ordinate rescue efforts. One of these efforts is aimed at the cichlids. To save these tiny fish from further extinction, researchers are breeding 40 different species in aquaria in the United States and Europe under an IUCN (World Conservation Union) programme.

At the grassroots level, a Kenyan group of professors, researchers, and community leaders called "Friends of Lake Victoria," or OSIENALA as abbreviated in the local Luo language, is working to protect the interests of local fishermen and to encourage aquaculture. In order to ease the demand that is affecting the size and diversity of Lake Victoria's fish stocks, OSIENALA is co-operating with local groups to educate the many millions of people who are dependent on the lake about the advantages of fish farming.

Uphill fight for flamingo lake

The pink flamingoes that feed along the shorelines of Kenya's Lake Nakuru attract more than 100,000 tourists every year. But the tourist image hides the truth: Nakuru town and National Park are suffering an environmental and human problem.

Lake Nakuru dominates the National Park where there is an intricate number of habitats for wildlife. The park is a Ramsar site – a protected wetland – as well as a rhino sanctuary.

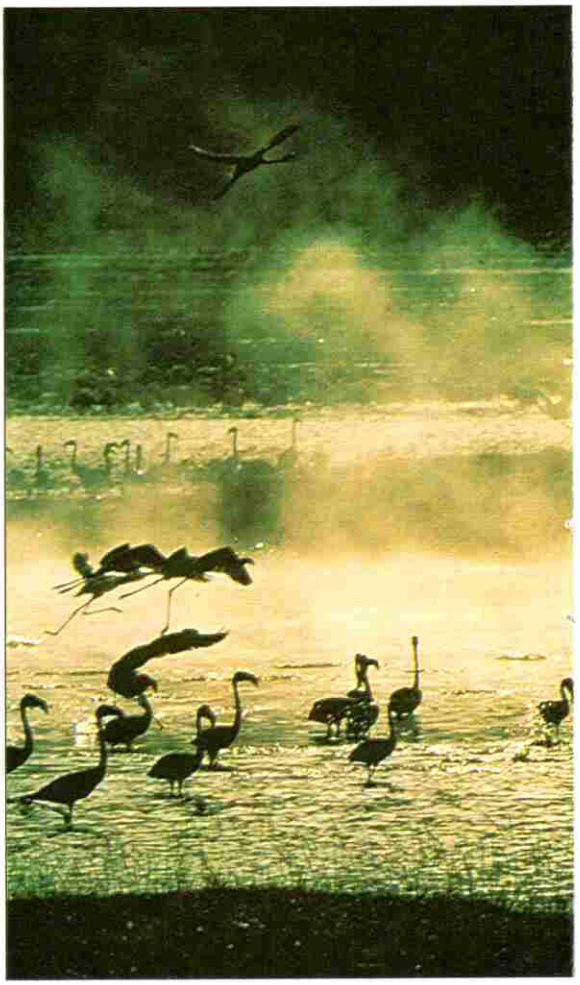
But high human birth rates and an increasingly dense population has meant that forests are cleared for farm land. The result is that during the rainy season huge gullies open up in the remaining fragile soils and steep slopes with topsoil being washed into the streams serving Lake Nakuru. The few remaining trees are placed under further stress as their lower branches are removed for fuel. Local women regularly spend three to four hours a day searching for wood.

At the same time Nakuru is growing – it is now the fourth largest town in Kenya – and its population of 250,000 produces large quantities of domestic and urban waste. A tannery, agro-chemical plant and battery factory all discharge their waste into the town's sewers, creating a dangerous cocktail of pollutants. The amount of local domestic waste has overwhelmed the existing water treatment plants. The result is that sewage is discharged directly into the streams which serve the lake.

In the face of this crisis, local groups are developing activities to reverse the tide of environmental destruction. The local branch of the World Wide Fund for Nature, with the help of various projects are promoting sustainable practices among rural communities by demonstration and education. But they also encourage environmental issues to be considered by policy and decision makers in the towns.

An education centre has been developed at the edge of Nakuru town, close to the park gates where WWF holds courses on environmental education in conjunction with the Kenya Wildlife Service, which is responsible for the management of the park.

Local people including schoolchildren, teachers, village chiefs, church groups and government officials learn how their activities affect their environment. Many are taken into the park, often for the first time, to see what is on the other side of the fence. They also learn how the park earns money



M & C DENIS-HUOT
KENYA BIOS/STILL PICTURES

from tourism for the local community. A proportion of the revenue raised is allocated to the local community.

This education has to be followed with practical advice and WWF has been running workshops at a small centre outside town. Women's groups attend the workshops where they are shown how to grow and plant trees and are taught about soil conservation, composting and agroforestry. To the women farmers these techniques are not only good for the environment upon which their livelihood depends, but they ease the burden of work by increasing the output of their farms. The fuel-efficient 'jiko' stoves, promoted by the project, use half as much wood as the traditional three stone fires.

The commitment of the local people is the essential ingredient for the success of any sustainable development project. Although Nakuru faces an uphill battle to turn the environmental degradation around, it would seem to be moving in the right direction. ■

Philip Smith is Editor of WWF News, *UK*

Another promising development is the Lake Victoria Research Team, formed in the late 1980s as a result of studies by the US National Undersea Research Program in collaboration with local scientists. The studies revealed that below 30 metres, plants, animals and other organisms were dying because oxygen levels were too low. The Team, funded by a range of international bodies, was formed to intensify research efforts. They have discovered an abundance of a small shrimp, *Cardina nilotica* , in sections of the lake where the oxygen levels are too low for the Nile perch; and an increase in the number of snails. They have also found that populations of snail-eating fish have fallen drastically, a situation that could favour the spread of bilharzia.

Although the lake has been wantonly damaged over the years, it must not be allowed to die. Lake Victoria is invaluable to the many millions who depend on it for food, for employment and for recreation. And the population around the lake is increasing rapidly. Concerted efforts by the governments and local communities in all three countries is needed if matters are to be put right. ■

Nancy Chege, a Kenyan, is a staff researcher at the Worldwatch Institute, where she researches the relationships between socio-economic inequalities and environmental degradation with a focus on Africa.

A fisherman speaks

Ezekiel Onyango is 36 and his earliest memory is of fishing on Lake Victoria. At Dunga Beach, 10 km south-east of Kisumu, Kenya's third principal town on the shores of Lake Victoria, where he sets off to fish, Onyango is unhappy with developments of recent years. "Quite often, I come back with two, one, no fish at all," he complains.

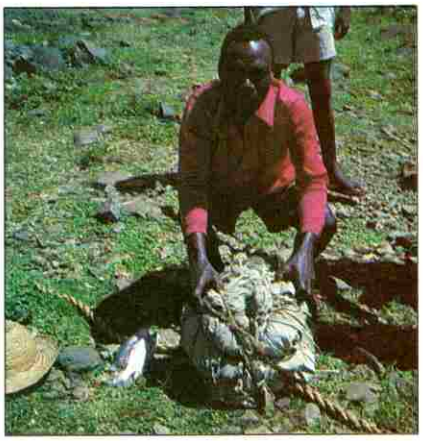
The fisherman, a father of six, blames his predicament on the construction of the Mbita Causeway in neighbouring Homa Bay District. The Causeway, which was built in 1984 to facilitate transport between the mainland at Gembe Beach and Rusinga Island, prevents fish from swimming across to reach other parts of the lake.

From an average 25 large species caught in the early 1970s, Onyango says he now regularly catches three species only – the *ngege, nyamami* (tilapia) and *mbuta* (Nile perch).

"I have no other means of livelihood and I just have to continue throwing in the net and ask God to give me at least something," he says on landing about 20 fish, mainly small *ngege* on the day we met, in December. His wife, a fishmonger, specializes in selling small fish; critics say they are caught by outlawed seine-nets – which catch both mature and young fish, indiscriminately.

"Whenever things go wrong, I depend on the mother of my children to feed the family," he says, oblivious of the fact that his wife's trade may be a contributor to his predicament. He also gets some support from his Dunga Fishermen Co-operative, which retains 10 per cent of all the day's proceeds.

He believes that unpredictable weather conditions may have interfered with the breeding habits of fish. He also feels a lot needs to be done to ascertain



the realities behind declining fish catches. "If the Nile perch is responsible, then why doesn't it eat the nyamami?" he asks.

In normal times, Onyango's daily catch earns him a low of KSh 300 to 400 although at the best of times he can net KSh 3,000 (US$ 67). ■

Pamphil Kweyuh

Saving Malawi's silver treasure

ANTHONY BANNISTER

Lake Malawi, the ninth largest and fourth deepest in the world, is the southernmost of the African Rift Valley lakes. It is also the richest lake in the world with its amazing diversity of fishes - more than 600 species. Covering over 30,000 km2, the lake dominates this small landlocked country and is also shared by Mozambique and Tanzania. Its fish provide over 70 per cent of the animal protein consumed by an estimated 10 million people in Malawi alone. Conserving the lake's diversity of fishes while maintaining its fisheries is of prime concern to the Malawian Government. Steps are being taken to tackle the problem constructively, including looking at the potential of underwater parks. *Alexandra Craib* **reports:**

Left: *View of Monkey Bay in Lake Malawi National Park, showing the intense use of the lake shore for human settlements.*
Below: *Fishermen set their gill nets on Lake Malawi near Namaso Bay.*

A dug-out canoe idly moves across the water, a boy catches fish in the shallows, a distant trawler crosses to an island, while the sound of laughter is heard from a nearby village. Along the lakeshore a woman approaches the water's edge to scrub her dishes with the coarse grainy sand, further down fishermen are mending their nets. It is an idyllic setting with a white-chested cormorant perched on a pole to dry its wings, darters dabbling in the water and the cry of African fish eagles accompanying the seemingly harmless activities of birds and people.

"In the past these activities were harmless, but today the canoe should be seen as one of hundreds, the little boy as one of thousands, the trawler as one of many, the village as a densely populated one like villages all over Africa with its inhabitants in need of food, often in desperate need of food," says Dr Tony Ribbink who has been researching the lake's fishes for 20 years. Already one of the most densely populated countries on the African continent, Malawi has a population growth rate of over 3.5 per cent which means that in 20 years there could be as many as 20 million people.

Currently Acting Director of the J L B Smith Institute of Ichthyology at Rhodes University in South Africa, Dr Ribbink was instrumental in the establishment of Lake Malawi National Park, the first underwater park in the world intended to conserve the freshwater fishes of a deep lake. The park lies at Cape Maclear at the southern end of the 600-kilometre long lake (which is 80 kilometres at its widest point and reaches depths of over 700 metres). It protects more endemic vertebrates than any other park in the world and in 1984 was declared a World Heritage Site.

"It is a model park demonstrating the value of underwater sanctuaries and has the potential to set a trend for managing Africa's threatened freshwaters," says Dr Ribbink. Protecting fish breeding grounds will not only conserve biodiversity, but together with effective management of trawlers outside of these areas will help restock the food fisheries.

The lake provides more than 50,000 tonnes of fish a year but throughout the country there is concern that the stocks are severely depleted. Fishermen complain that there are few fish to catch and that "the fish are small now." The Chief of some 6,000 people in the village known as Chembe points out that with more people fishing day and night, "the

fish can never sleep." Chembe is one of the five villages included within the park boundaries, an innovative aspect of the approach being adopted to conservation by the Malawi Government.

"We are trying to get local communities to participate in conservation," says Chief Parks and Wildlife Officer, Matthew Matemba. "We know that tourism stimulated by national parks contributes to foreign exchange, but to the man living in rural areas, practising subsistence farming, who at the beginning of the rainy season has run out of food, tourism does not mean anything. He sees protected areas as land wasted. So the approach we are using is to involve people in conservation initiatives and enable them to receive tangible benefits."

The villagers living in the park have been allowed to continue with their traditional fishing with certain limitations protecting fish breeding grounds. A training programme co-ordinated by Dr Ribbink and supported by the Southern African branch of the World Wide Fund for Nature (WWF), is assisting park rangers to develop an understanding among villagers that protecting the lake's fishes in an 'out of bounds' zone is to their benefit. This zone is a 100-metre band around each of the 13 islands within the park and off the mainland shores (except at the villages themselves).

"Historically fisheries management in Africa's freshwaters has been beset by failures. To regulate a fishery means regulating people so that they do not catch too many fish, do not take fish in breeding season, do not interfere with fish production. But getting hungry people to obey regulations is costly, difficult and unpopular," says Dr Ribbink. He believes in the value of environmental education programmes that foster understanding of the reasons for regulations and help the lakeside dwellers to realize why "the fishermen are not catching fish."

Many claim that "the lake has changed and the fish have run to another place." Mr Laurence Kaunda who was born in the park area says that the reason their fathers caught fish more easily than he and his brothers do, is that "God is angry with us now."

Scientists have more pragmatic explanations such as fishing pressure, accounting for the fact that a number of species such as Tsungwa, Saguga, Kadyakola, Kobau, Ngumbo – all of which produce large fish – have not been seen for several years. It has also been shown that only the upper 150 to 200 metres of this deep lake can support life which depends on oxygen, thus it can only sustain a smaller fishery than the size of the lake would give one to believe. The open waters, away from the shore and over deep areas, are almost devoid of fishes. Most are to be found in the shallow regions which are subject to the heaviest fishing pressure.

A compounding factor is that more than 90 per cent of the fishes of the lake belong to the family Cichlidae. These are slow growing fish which produce a ▶

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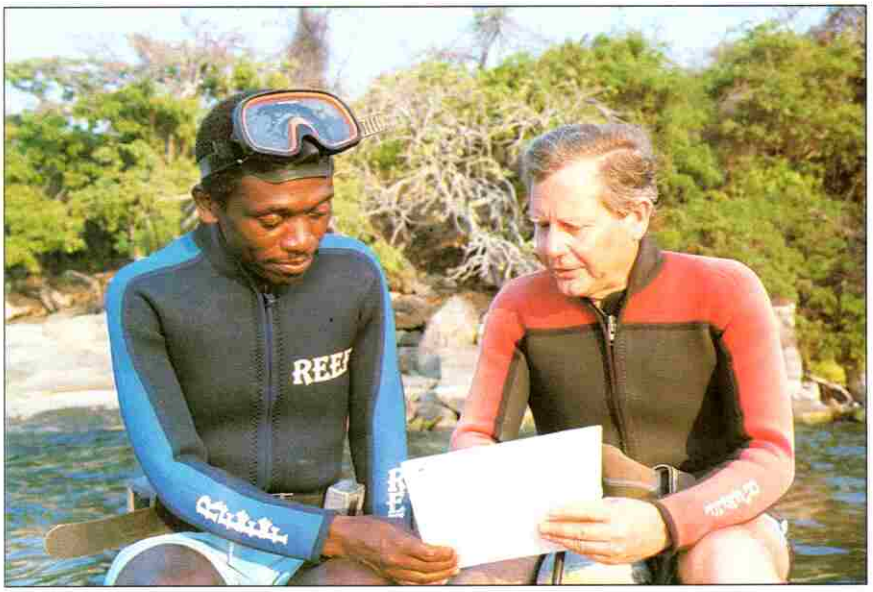
Left: *Tender boat carries ashore a single box of fish caught in a three-hour trawl.*

Below: *The Dedza escarpment, where even the steepest slopes have been cleared and hoed for crops.*
Bottom: *Simon Munthali (left) discusses his latest research discoveries with Dr Tony Ribbink.*

ALEX CRAIB



ALEX CRAIB

few large eggs. Once fertilized, the eggs are held in the mouth of the female until the young are big enough to swim freely. Even then the parental duties are not over and will continue for anything from a few days to a few weeks. This means that stocks are slow to recover as time is needed for growth and reproduction.

Conservationists' concern is that heavy exploitation of the shallows will lead to irreversible loss in species diversity. The hundreds of small, brightly coloured busy fish in among the rocks are known as the jewels of the lake – attracting tourists and fascinating aquarists worldwide. Not only are there more than 600 species, but males and females are nearly always different colours and some females may have as many as four different colour forms.

Park rangers who have taken part in the training programme have been introduced to scuba diving, enabling them to explore the underwater world of the park. PhD student Simon Munthali spends up to six hours a day 'fishwatching'. Previously he had researched elephants, but now says that "Fish are more exciting!"

Interpreting the thousands of activities taking place simultaneously underwater is a challenge. Fishes weighing no more than seven grammes build sandcastle nests that require moving 500 kilogrammes of sand, a little at a time by mouth. Others dig crater-like spawning pits so wide that a spread-eagled scuba diver cannot touch the sides. Still others, living in rocky areas, so fiercely defend their territories that they have private algal gardens, while the less aggressive live in rock crevices or empty snail shells.

One of the most serious threats to the lake is that in a country which depends almost entirely on farming, with no substantial minerals and little industry, subsistence agriculture has virtually run its course. There is no land left to cultivate. Travelling down to the lake over the Dedza escarpment one notices that even unacceptably steep slopes have been cleared and hoed for crops, right up to the edge of streams and rivers. Topsoil is washed into the rivers and carried to the lake as tropical downpours rush through these arteries. The huge silt loads and ferocious rush of water curtail the breeding opportunities of fish from the lake which used to enter the rivers to spawn in running water, flocking up against the flow. Too many fishermen are also spanning the rivers with nets to catch these fishes on their spawning runs, such as at the Bua River, an important breeding ground for lake salmon.

The abrasive sediment deposited in the lake changes habitats and kills much of the life that produces food for fish. Although no figures exist for Lake Malawi, a study of similar problems in Lake Tanganyika showed that a 61 per cent decrease in biodiversity resulted from deposition of sediment by rivers.

The lake could also become a sink for pollutants, fertilizer and other waste carried by the rivers.

"The prospect of pollution is frightening as the retention time of the lake is over 1,000 years. This means that water is changed once in more than 1,000 years," says Dr Ribbink. "Fortunately, Malawi is striving with some success to prevent the lake from being spoiled, but its current state is fragile." ■

Alexandra Craib works as an environmental journalist for the Southern African Nature Foundation.

Lake Baikal:

a threatened jewel

by Alexander Shestakov

"Glory sea, Holy Baikal..." is the beginning of one of Russia's most famous folk songs. Like the Volga River, Baikal is a national treasure. And, in 1990, it was added to UNESCO's list of World Heritage Sites, to be cherished and preserved for the benefit of humanity.

Baikal is full of superlatives. It is the deepest lake in the world, plunging down to 1,637 metres. Like a long, deep gash in the earth's crust, its 31,000 km^2 surface area holds 23,000 km^3 of water – nearly a fifth of all the freshwater on earth (not including glaciers). Baikal is fed by 336 river systems, which provide it with some 60 km^3 of water a year. Its drainage basin covers more than a million km^2 of Siberia and Mongolia. And it is the oldest lake on the planet, dating back more than 3 billion years.

Not surprisingly, Baikal boasts a rich diversity of plants and animals, many of them found nowhere else. Of 2,600 species of plants and animals which thrive in the lake's clear, oxygen- rich waters, 84 per cent (some 1,800) are endemic. Among the lake's unique species include the Baikal seal, the only freshwater seal on the planet, and a special fish, the omul (*Coregonus*

OLIVER GILLIE/STILL PICTURES

Left: *The Western shore of Lake Baikal, Siberia - known as Little Lake Baikal.*
Below: *Spring flowers cover the meadows soon after the snow melts.*

autumnalis migratorius), which is an important source of protein for the people who live around lake and depend on it for their livelihoods.

The Baikal region is also rich in natural resources, including gemstones and valuable minerals, such as diamonds, gold, silver, nickel, iron-ore, lead and zinc. Its timber reserves are estimated at 4.5 billion m^3.

As of 1994, some 2.6 million people lived in the vicinity of the lake. Although population pressures are low – there are only 2.5 people per km^2 in the region as a whole – human activities have had an increasingly negative impact on the lake and its ecosystems, especially in the second half of the 20th century.

Ironically, economic development began over 300 years ago with the founding of the Irkutsk prison colony in the first half of the 17th century. Once the region's natural wealth was realized, development accelerated, particularly after the Russian Revolution of 1917. But economic development of the region did not shift into high gear until after the Second World War. During the post-war period, metallurgical industries were built, along with pulp and paper mills, power plants burning fossil fuels and saw mills, processing timber cut in the lake's generous watershed.

Agricultural activities intensified over the same period. With Baikal soils highly unstable, increasing loads of erosion sediment were flushed into near-shore waters. Soil erosion to the lake increased by two and a half times over the past 50 years.

With the soil came mounting pollution from agricultural chemicals, especially organochlorine pesticides like DDT. In 1986 scientists monitoring the health of the lake estimated that about 230 metric tons of DDT had entered Baikal's coastal waters; another 400 metric tons of the poison was thought to remain in agricultural soils around the lake.

In the period 1985-89, Russian scientists monitoring the health of the lake noticed that concentrations of DDT and PCBs had decreased in Baikal seal pups, but increased in adults over 20 years old (reaching levels of 60 mg/kg of blubber).

Atmospheric pollution in this sensitive region has also increased with the level of industrial development. Polluting emissions from industry and municipalities around the lake, particularly in the cities of Irkutsk, Angarsk, Ulan-Ude, Shelikhov, Cheremkhovo and Sludyanka, have had localized impacts on the environment. In 1989, emissions from stationary sources in these cities and surrounding areas amounted to 664,000 metric tons of particulate pollution.

The real polluter of Baikal, however, is liquified wastes from both industrial and municipal sources. None of the cities in the region, for instance, have adequate sewage treatment plants; much of the sewage goes into the lake untreated or only partially treated. And industrial effluents are a growing menace to the lake's near-shore ecology.

The worst offender by far is the Baikal Pulp and Paper Mill, which began operating in 1966. Situated in Baikalsk City, it produced 163,000 metric tons of different types of sulphate cellulose in 1989. Effluents, which are pumped into the lake virtually untreated, have formed a highly polluted zone on the lake bottom covering some 20 km^2. In 1992, investigators discovered that the plant was discharging over 74 million metric tons of untreated waste water into the lake every year. Recommendations made by a panel of experts came to nothing with the breakup of the Soviet Union and the devolution of power from Moscow to oblasts (regional governments).

Another big polluter of Baikal is the Selenga River, the lake's largest feeder river, which originates in Mongolia, and courses through a heavily industrialized area before dumping its polluted waters into the lake. It brings in hefty loads of heavy metals, nitrates and sulphates, along with oily wastes. "Boat captains will not go within a mile of the Selenga delta, because pollution is so thick," notes Gary Cook, Director of Baikal Watch at the Earth Island Institute in San Francisco.

More recently, the state of Baikal's forests have also deteriorated, both from pollution and over-harvesting. Nearly 8 million m^3 of timber were logged in the region in 1993. With little in the way of replanting taking place, ecologists worry that the decreased forest cover will pose more problems for the region's besieged animals, especially those threatened with extinction like the snow leopard, red wolf and two species of crane (the hooded crane and Siberian white crane). Another 110 species of animals in the Baikal region are threatened.

Conservation of Baikal started in the 1960s, with a special Ministerial Decree which limited economic activities in the lake's watershed, called for the rational use of the region's resources and set aside reserves and protected areas. In 1971, 1977, 1987 and 1988, additional decrees were issued aimed at the rational management of the lake's huge basin. During this period, more than 21 million hectares were set aside as national parks, scientific reserves, protected landscapes, scenic rivers, greenbelts and landmarks.

Presently, the lower house (Duma) of the Russian Parliament is considering a draft federal law on the comprehensive management of Baikal and its watershed. If passed, this law would also create a conservation zone around the lake – divided into three ecological zones – which would limit development activities. In November 1994, Prime Minister Chernomyrdin signed a decree creating a federal programme of some 100 practical measures to stabilize and improve the Baikal Region's ecological situation over two years. Estimated costs are 1,640 billion roubles ($440 million). The 15-person Baikal Commission established by the decree consists of representatives from ▶

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Native peoples hold key to success

The population of the Baikal region comprises about 100 ethnic groups, but most of them are very small. Russians account for more than 70 per cent of the inhabitants, and the largest ethnic minority, the Buryats, make up a further 25 per cent. Among other indigenous groups are the Evenks (who originated in the Baikal region but resettled all over Siberia), the Tofalars (fewer than 1,000 people) and the Soyotes (or Tuvinians).

The Buryats (some 300,000 live in the Baikal region) are of Mongol origin and Buddhists. Before the Russian Revolution Buryats divided traditionally into two groups: settled cattle-breeders and farmers, and nomadic herdsmen.

Industrialization and the policy of settling nomadic people destroyed their ancient ways of life, economies, ethics and farming traditions. Intensive ploughing of virgin lands in the 1950s led to a sharp reduction in pastures and hayfields, which had an impact on cattle breeding. At the same time the Buryats were forced to increase the numbers of sheep they reared, resulting in a sixfold overcapacity of the remaining pastures.

Rural settlement were amalgamated under a Stalinist policy of eliminating "unpromising" villages (1,250 of which vanished between 1939 and 1989).

'Modern development' also affected the Evenks, who lost their ethnic identity and came to the threshold of extinction. They now number only 1,650 and their life expectancy is one of the lowest of the indigenous peoples of the former Soviet Union – only 32 years.

With the Evenks affected by the policy of compulsory settlement, the taiga forest lost its thoughtful guardians, who were replaced by alien hunters and loggers who only looked on the forest as a source of profit. Intensive regional development deprived the Evenks of their traditional economy based on hunting and fishing, which was further disrupted by the construction of the Baikal-Amur railroad.

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Most ethnic groups had a very strict system of taboos for using natural resources, supported by the Shamanist and Buddhist religions. No one was permitted to kill a doe with young or immature animals. The hunting of rare species was forbidden. No felling was allowed in certain forest areas, and the Buryat never felled timber near the Lake.

Anti-religious policies led not only to the destruction of about 40 Buddhist temples and churches and the persecution of shamans and lamas, but also to the extermination of spiritual traditions and the nurturing attitude of the local people towards natural resources.

Ecological problems in the Baikal region cannot be resolved without the preservation and support of the unique local ethno-cultural systems. According to one expert, Sergei Shapkhoev, "the preservation of Lake Baikal and that of the ethnic diversity of the Baikal region are two inter-related goals which should be pursued together."

Alexander Shestakov

all layers of government, from the federal level down to oblasts (regions) and districts (rajony).

"So far," says Sergei Shapkhaev, director of the Commission, "We have not encountered opposition. The most serious problem seems to be that the actual mechanisms of enforcing laws in court are not in place."

The first zone, called the Central Zone, includes the lake's water area, including all islands, a coastal water conservation area and adjacent protected reserves and parks. In this zone most economic activities are prohibited. Special articles will regulate land use in this area, including forestry, recreation, tourism and mining.

The second zone, called a Buffer Zone, consists of the catchment basin surrounding the Central Zone, but within Russia. In this zone all nuclear

SEAN SPRAGUE/PANOS PICTURES

Left top: *Garlic and berries on sale at Ulanude market in Buryat, Siberia.*
Left below: *Children fishing at Nizhne Angarsk, Lake Baikal.*
Right: *Bharatpur - much of the wetland surface choked by plant growth.*

SUNJOY MONGA/PORPOISE PHOTOSTOCK

activities, including the transport and disposal of nuclear wastes are prohibited, along with the storage of dangerous chemicals.

The third zone is mostly one of atmospheric influence and consists of the territory around the lake which lies outside the catchment basin to the north and northwest, up to 200 kilometres away, which could affect Baikal through the atmospheric transport of airborne chemical pollutants.

A special article in the proposed legislation deals with the special needs and interests of local indigenous tribes in the region of the lake, including the Buryats, Evenks, Soyots and Tofalars (see box).

Among the priorities for proper management of the Baikal region include the following:

- Sorting out major land use issues and the development of legislation to support sustainable land use practices.
- Working out interagency and intergovernmental mechanisms of co-operation in managing the region.
- Setting up a monitoring network and disseminating information to policy makers on Baikal's environment.
- Retooling the energy industry, so that it is far less polluting and far more efficient.
- Upgrading all polluting industries.
- Promoting the rational and ecologically sound management of agriculture in the region.

Although the jewel of Siberia is not as threatened as it once was, there is still much work to be done in order to safeguard this unique ecosystem and the communities of plants and animals that it supports. Baikal is back from the brink, but the region needs a comprehensive management plan, one that takes into consideration the needs of local communities. Once the region's people are behind a management plan, there is no reason it cannot be made to work sustainably, preserving the lake's ecology and the economies of the people who depend on it for their very lives. ■

Alexander Shestakov is Director of the Institute of Geography at the Russian Academy of Sciences.

India's dying lakes

by Darryl D'Monte

All of India's lakes are under siege – from new threats as well as traditional ones. In Chilka, in the eastern state of Orissa, prawn farmers are seeking to exploit this inland sea, the largest brackish water lagoon in Asia, with full blessings of the state government. An $8 million aquaculture project launched by the Tata industrial house, the country's biggest, was resisted by fishermen and had to be abandoned, but the smaller schemes are sprouting everywhere along Orissa's 480 km-long coastline.

The Bhitarkanika sanctuary, also a large freshwater body, is similarly being targeted for aquaculture, with all the shrimp for export. As many as 26,000 hectares along the Orissa coast have been identified by the World Bank for fish farming, with only 1,350 hectares reserved for small fishermen.

But more time-honoured threats abound as well. The Loktak Lake in the tiny north-eastern state Himalayan state of Manipur, one of India's three Ramsar sites, is being choked by a hydroelectric project. Rashmi De Roy, programme co-ordinator of wetlands of WWF-India, told a magazine: "The problem with wetland conservation is not merely the local economic pressure. More pertinent is the fact that most wetland development policies of the government are proving detrimental to the natural functioning of the economic cycle of the sites."

The natural flow into the Lake has been curtailed and the 290 km^2 wetland has been converted into a reservoir, altering the ecological balance and disrupting the natural flood and fuel chain which local people depend on. According to De Roy, the pressure on wetlands is from outsiders who are in a hurry to develop such areas for tourism or fisheries under the mistaken belief that they are otherwise not being exploited. The Loktak Development Authority has taken "protective" measures, including a ban on cultivation in the park and erecting fences to prevent people from entering, but this has only heightened the villagers' hostility.

Perhaps the most celebrated case in the country is that of the Keoladeo National Park in Rajasthan, in the north-west, also a Ramsar site. It is better known as the Bharatpur bird sanctuary and lies cheek by jowl with the Taj Mahal, which is why its migratory birds are almost as big a tourist attraction as the world-renowned monument. This unique wetland dries in summer but is fed from waters of two rivers impounded by a barrage. Thanks to uncontrolled use of this water in the last two decades, however, the park has been facing periodic droughts, which prove catastrophic for the birds and the vegetation on which they thrive.

A ten-year study by the 110-year-old Bombay Natural History Society (BNHS) recommended "an integrated development programme...to be implemented taking the needs of the villagers into account." What the naturalists refrain from mentioning is the clash between villagers and the park authorities over a decade ago, in which a few villagers were shot dead by the police. They were agitating against the deci- ▶

sion to bar them from grazing their buffaloes in the park.

Some ecologists argue that such a ban is justified because the buffaloes would disturb the delicate breeding and other natural cycles. It is perhaps partly due to human interference that Bharatpur's most famous annual visitor – the Siberian crane has been missing in recent winters. Wading through the shallow wetland, the buffaloes trample on nests and destroy the under-growth on which the birds perch.

However, there is another school which believes that the buffaloes have been around for a couple of centuries and have become part of the ecological life of the sanctuary. Their dung provides nutrients for vegetation and, what is more, they devour weeds which choke the wetlands otherwise. The study, headed by Dr V S Vijayan of the BNHS, actually advocates the controlled return of buffaloes to the park as "the traditional primary consumers of the wetland."

The study concludes: "The history of Keoladeo National Park presents an unique feature of man's interaction in the evolution of an evanescent, temporary, rainfed tiny tank into a world famous waterfowl refuge. The culture and economy of the villagers around the park had played a remarkable role in the transformation and maintenance of the system." As many as 18 villages surround the park and the residents depend on it for their livelihood. Co-existence is feasible and desirable.

Dr Lata Vijayan, an ornithologist from Coimbatore, who assisted her husband in the study, believes that wetlands like Keoladeo are "vulnerable because they are open systems influenced by activities from the outside and also by the inadequacy of the support and participation of the local people."

According to De Roy, development strategies for conservation and sustainable use are applicable to all important wetlands in India. The government should shift from treating this invaluable resource as commercially exploitable to attempting to rehabilitate them ecologically, taking into account entire drainage systems, rather than examine each wetland in isolation. It should also not physically modify these wetlands drastically and, perhaps most important of all, learn how to incorporate people's management practices in their present-day maintenance. ■

Darryl D'Monte is President of the Indian Federation of Environmental Journalists.

The Great Lakes Basin ecosystem was once perceived to be a vast natural cornucopia in a generally benign climate. The Lakes from west to east (upstream to downstream) are Superior, Michigan, Huron (including Georgian Bay), Erie and Ontario. Short but large interconnecting channels direct the flow of water towards the St Lawrence River, and thence to the North Atlantic Ocean. With respect to geology, climate, ecology and culture it strongly resembles the Baltic Basin of Europe.

In the satellite photograph of the basin, the false colours tell a story of human settlement and its effect on the basin. The red areas represent cities, and the orange, largely agricultural areas. Over the past two centuries, the European settlers to the basin have been deeply committed to industrial and commercial 'progress'. This has occurred more often than not at the expense of the native Indians and the natural environment. Indians who were not assimilated into European culture were suppressed and confined to reserves generally on lands not valued highly by the entrepreneurs and settlers.

By the 1960s, all the waters in the areas adjacent to the red and orange parts of the basin had been severely degraded. Altogether 43 Areas of Concern were designated, where a valued natural ecosystem had become transformed into a dangerous and unhealthy ecosystem. One of these areas has been successfully rehabilitated and is now delisted. The worst areas, including the Niagara River, may not be delisted until well into the next century.

In recent years, the population of the US side of the basin has been declining, while the Canadian side has been increasing. The US population has moved to other industrial areas of the country such as the south-west, while the Canadian population has grown and urbanized at the expense of prime agricultural land, and the destruction of aquatic habitats such as wetlands. The Basin's population would have decreased more had it not been for immigrants from many parts of Asia and Europe.

Concurrent with population changes has been a reduction in heavy industry. Environmental improvements resulted, not directly from environmental reform, but rather from corporate policy to locate elsewhere. Meanwhile native peoples have been reasserting usufructuary rights to resources in large areas in which these rights were never ceded.

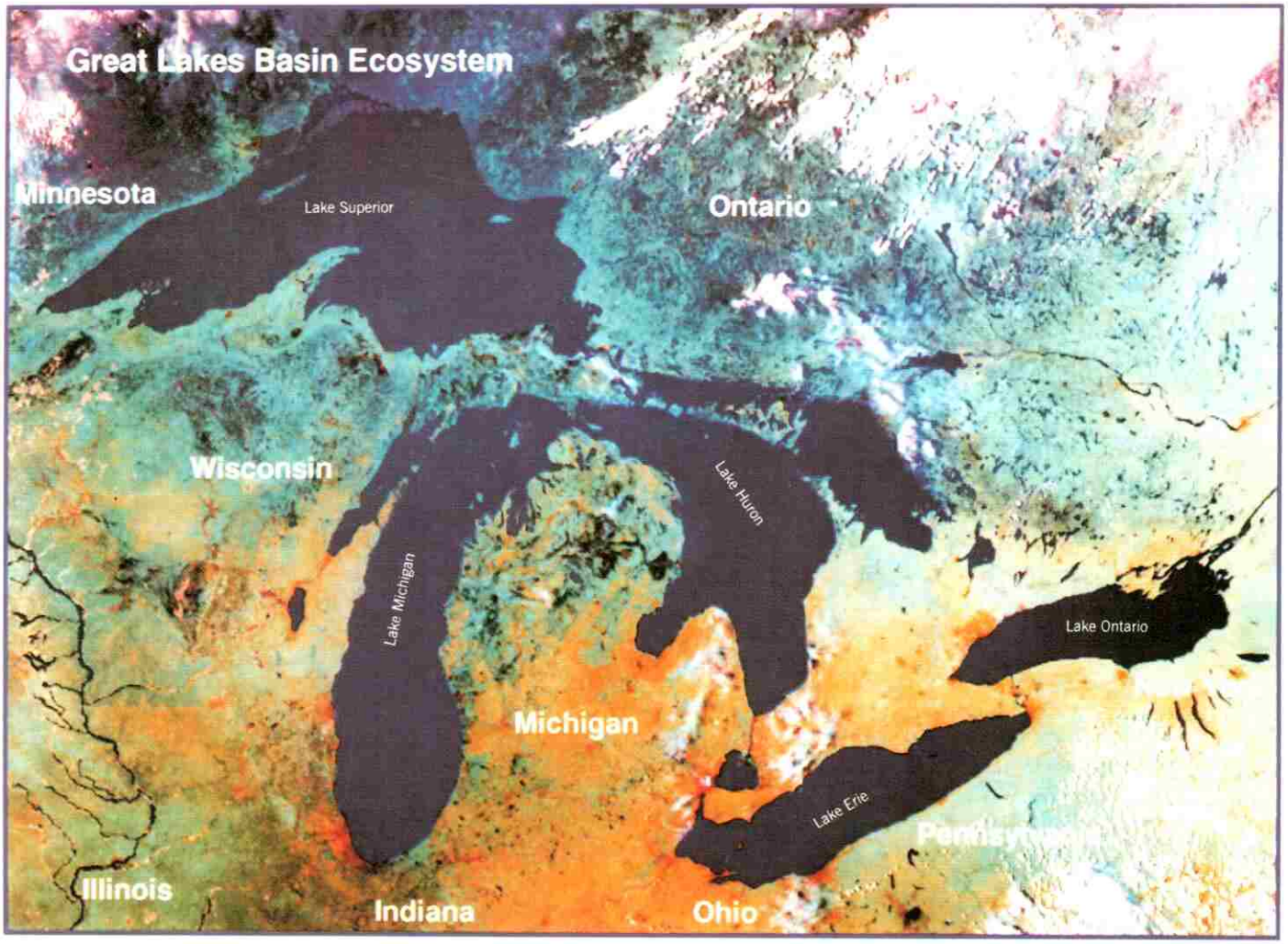
Human activities led increasingly to pollution of the Lakes. Problems associated with excess nutrient enrichment in Lakes Erie and Ontario prompted studies that led to a binational Agreement of 1972, and to a comprehensive attack on phosphorus in sewage effluent and in laundry detergents which cost billions of dollars. This led to a dramatic decline in phosphorus levels in Lakes Ontario and Erie.

In the 1960s and 70s, agencies of governments generally interposed themselves between industrial and other users of of the environment and the individuals and interest groups who felt harmed by those users. The Americans developed a strongly legalistic approach to the fair resolution of those issues, while Canadians relied more on persuasion and coercion. By the 1990s, a more balanced mix of approaches was apparent in both countries.

A more insidious environmental problem has been that of persistent toxic contaminants. First identified as a problem by Rachel Carson over 30 years ago, pesticides were designed to kill harmful organisms. But they also killed non-target species. By the late 1960s, the adverse effects of persistent pesticides such as DDT, and also of radionuclides, were sufficiently understood to result in strong government programmes which have been partly successful. Levels of these contaminants in the environment are now only a tiny fraction of their former levels. An example of such a trend is shown on page 29. Dioxin is a by-product of pesticide manufacture; it occurred as impurities in early pesticide formulations and now leaches from buried wastes of the manufacturing industry.

As a means of addressing the contaminants issue, four kinds of policies – generally of lesser cost to government – have been fostered since the 1970s:

- prevention of their release to the environment;



Restoring the Great Lakes cornucopia

Once a vast horn of plenty, the Great Lakes Basin has been badly affected by modern man's industrial, commercial, intensive farming and other activities. But there is still hope for rehabilitating the Lakes, as *Henry Regier* and *Harvey Shear* explain in this special report. Both authors have been involved in environmental conservation of the Basin, and Shear organized and co-chaired the first State of the Lakes Ecosystem Conference in Detroit in 1994.

- removal of highly contaminated material from hot spots and its destruction technologically;
- burial of contaminants in stable sediments, where gradual breakdown can occur;
- training of people to be aware of the dangers of these substances and to take precautions against contaminating themselves.

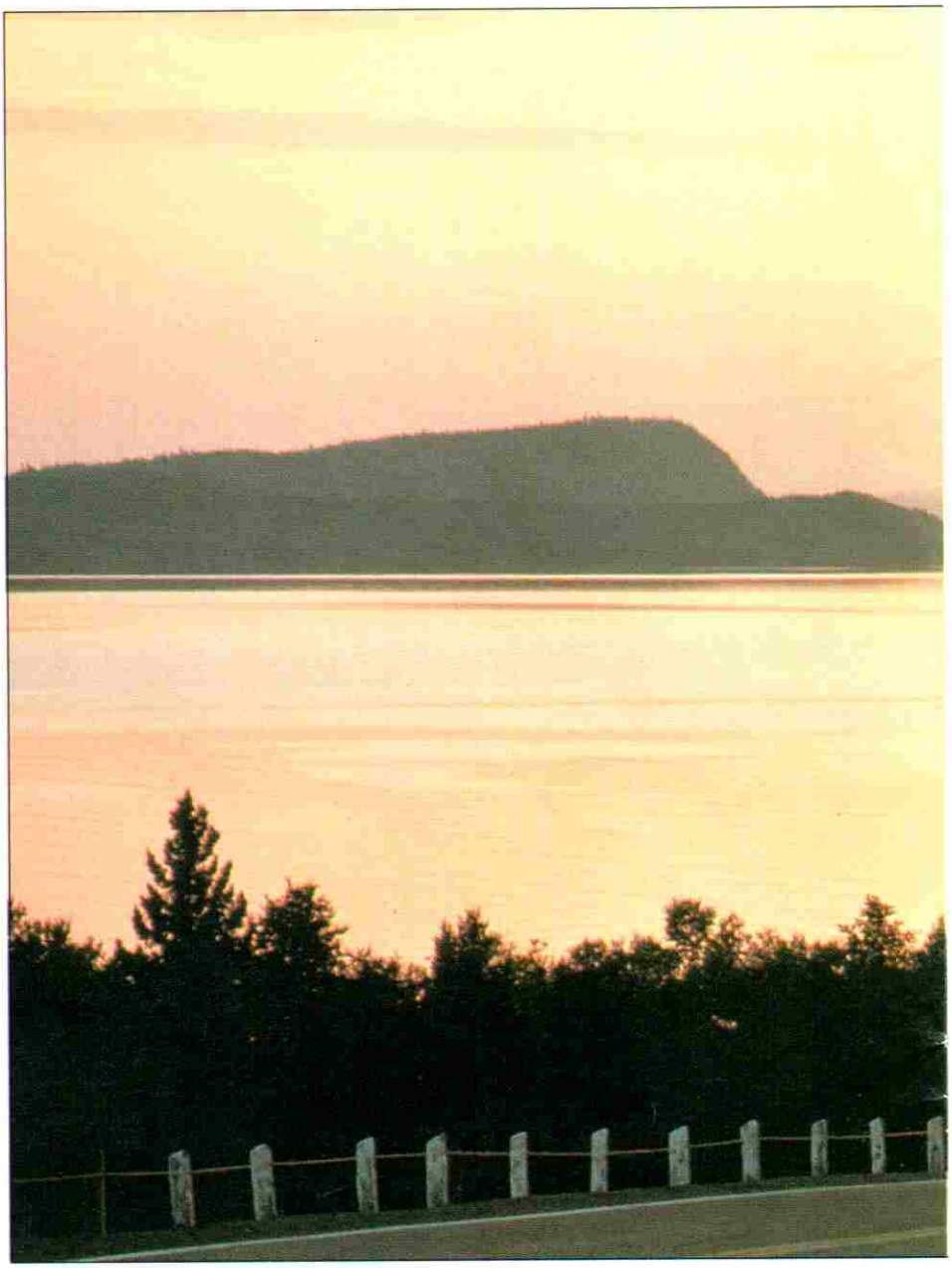
Each of these policies has been successful, in part. As social incentives to reform have displaced earlier legalistic disincentives, progress with the contaminant issue has been accelerating. The herring gull pictured overleaf has an extra foot, probably as a result of residual contaminants in the food chain, altering the gull's genetic code at a very early stage of embryonic development.

Anomalies of this kind are still seen in numerous species of animals, but now at low frequencies, and at only a few sites around the Lakes. The fact that we see any deformities at all is partly a result of a large increase in populations of some sensitive species. In the 1970s there were few gulls around the lakes and now large breed- ▶

ing colonies exist, because reductions in pesticide and contaminant concentrations have allowed these and some other species to flourish. Many scientists fear that some humans are also being harmed by contaminants.

European settlement in the basin has also resulted in the loss of some 80 per cent of the wetlands and much of the nearshore habitat near the urban centres. Valuable fish habitat was destroyed through removal of exposed gravel and rock, and by infilling for urban development. Governments and citizens are now acting to restore and protect habitat which has not been irrevocably lost .

People of the Great Lakes Basin use the aquatic system for many purposes including drinking water, discharge of biological waste, dilution of chemical waste, industrial process water, dissipation of industrial waste heat, transportation, generation of hydroelectric power, harvesting of fish and wildlife, recreation, and aesthetic appreciation. All these uses affect the environment, and other human and non-human users of the environment. Sometimes these adverse effects interact to create an impact greater than the sum of each separate effect. Innovators on shared governance in the basin have come to understand this complex interaction, and the need to manage a mix of uses within an 'ecosystem approach'.



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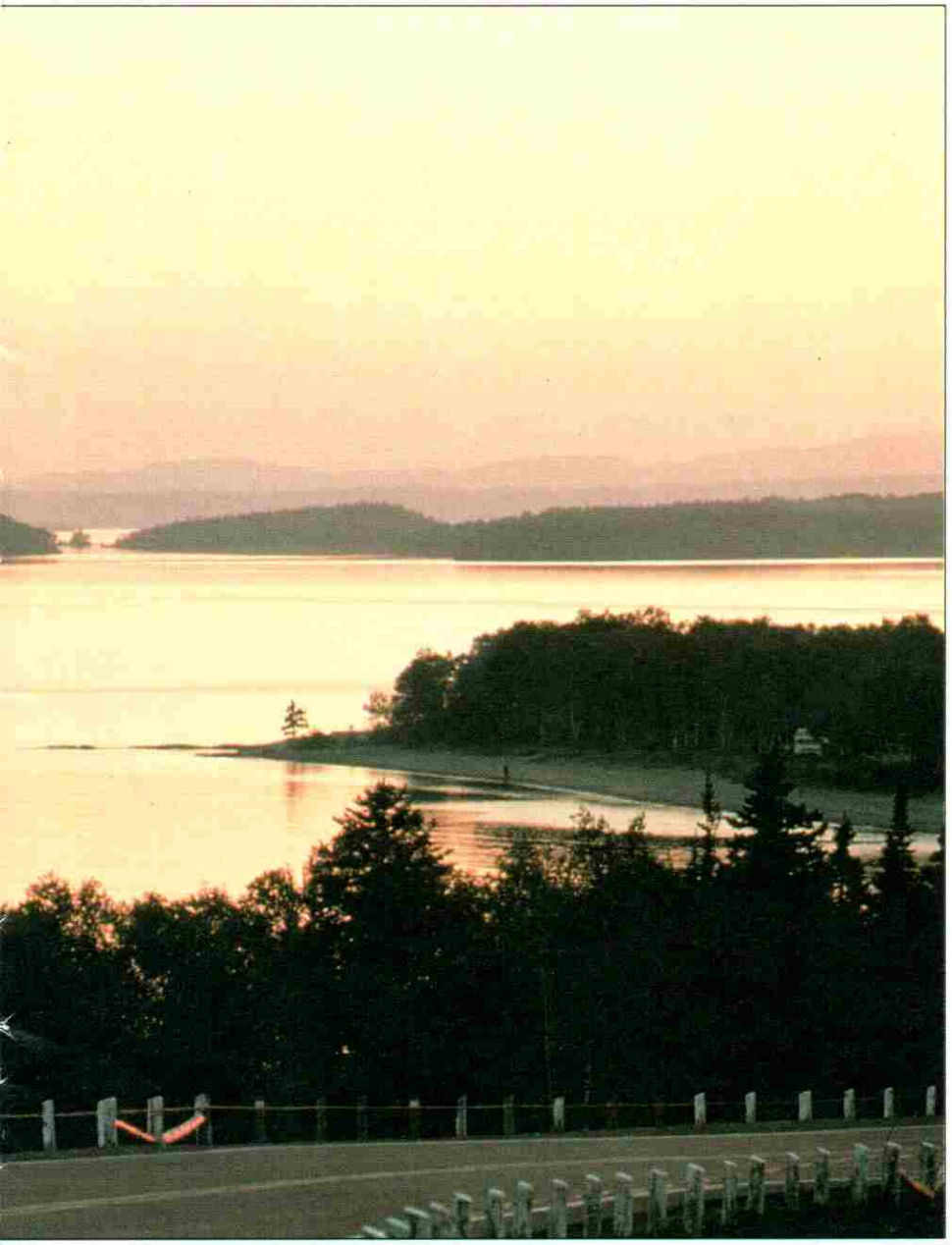
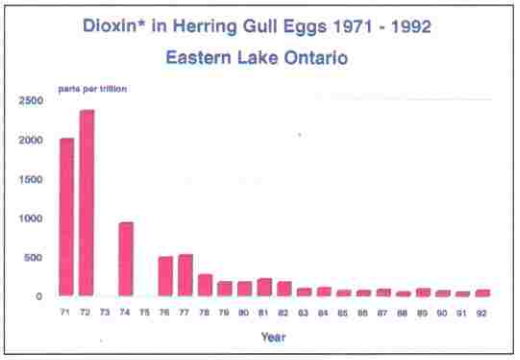
In practice, if not in legal theory, many users have acted under the assumption that the aquatic system of the Basin was either common property or no-one's property. Access to the resources was deemed to be open and free, and the onus to prove that a particular use caused harm lay with the individual who felt personally wronged. Legal constraints on these uses were introduced and gradually strengthened, use by use, by various levels of government in the Basin.

In the 1990s, rights and responsibilities for any use of the environment are being clarified in the context of the entire mix of interacting uses. The right to use the environment, and the accountability for doing so, are being made explicit, and are being administered in ways that cannot easily be ignored or misunderstood.

But despite the clarification of rights and responsibilities, and the increased activity in rehabilitating the environment, there is no hope of ever going back to a near pristine state in the areas of the basin shown in orange or red on the satellite photo. Thus the aquatic ecosystems of the southern half of the Basin will remain strongly modified. Although there have been improvements in ecosystem quality over the past three decades, we have no idea what new ecological features will manifest themselves in these ecosystems in the next few decades. The question "what sort of ecosystem do we want?" is seldom asked. So far, we have



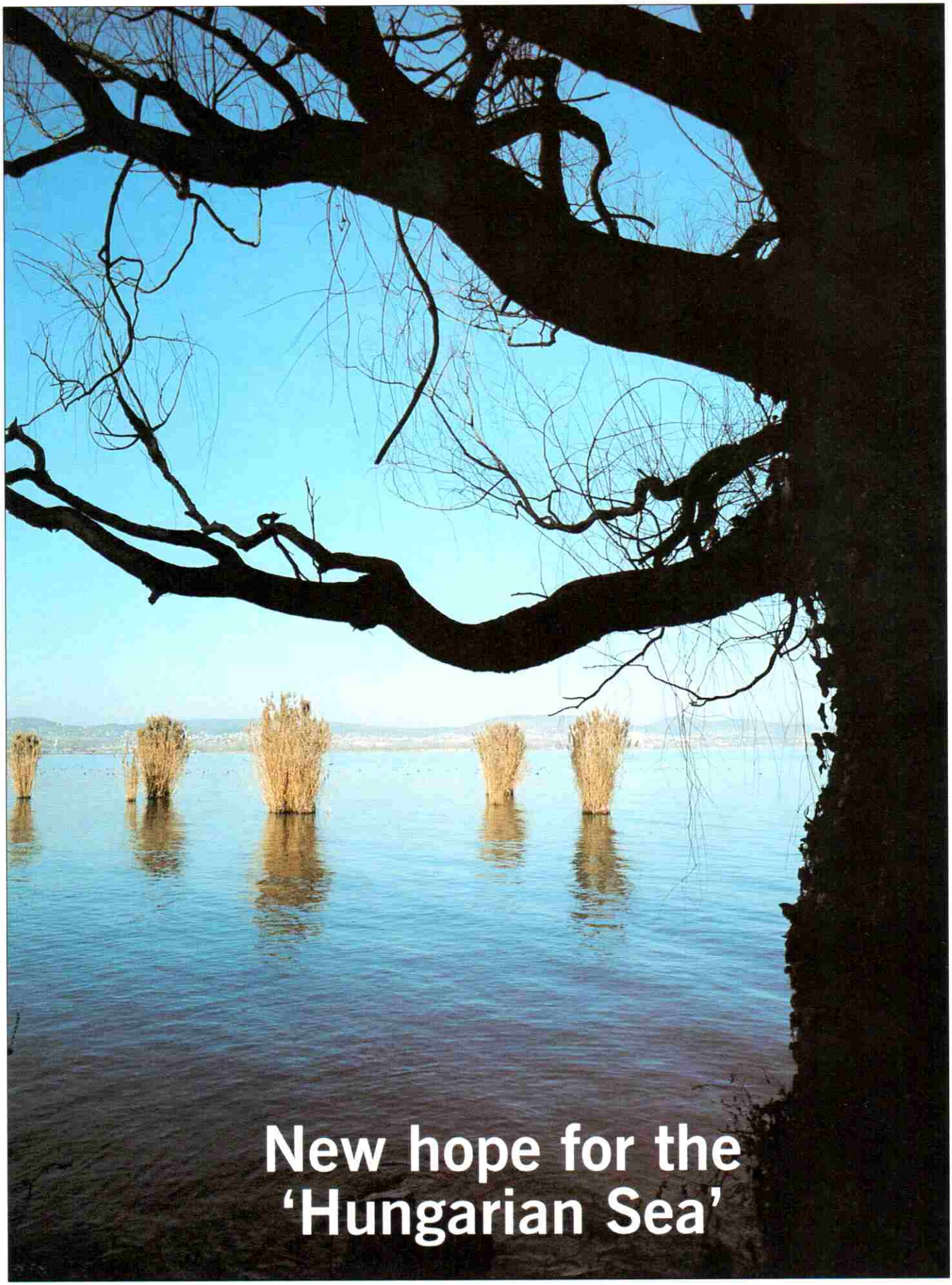


Left: *The population of walleye fish in Nipigon Bay has begun to recover.*
Above: *Lake Superior at sunset.*
Right: *A deformed herring gull with an extra foot, probably caused by contaminants in the food chain.*

lurched from crisis to crisis, fixing what we can. More is now expected, as reflected in the "Ecosystem Charter for the Great Lakes-St Lawrence Basin" recently created by a broad cross-section of interests in the Basin.

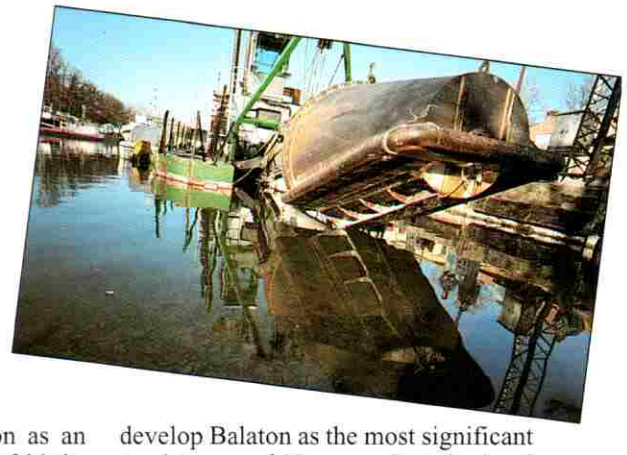
In considering the question "what sort of ecosystem do we want?" we must also ask what is feasible. Current scenarios of climate warming need to be considered in terms of their effects on the Lakes. While the Lakes may not suffer as severe a negative impact as other parts of North America, there could well be increased demand to transport Great Lakes water to parched areas of the continent. In addition, major migration into the Basin could occur, with all the negative environmental effects of a suddenly increased population. A precautionary "no regrets" policy to both climate warming and to the possible inflow of human migrants might involve the intensification of current environmental and political reforms. Meanwhile, appropriate efforts should be directed towards reversal of climate warming and to the prevention of conditions that would trigger large-scale human migrations out of their homelands. ■

Henry Regier is Professor of Zoology, University of Toronto. Dr Harvey Shear is Regional Science Adviser to the Canada Centre for Inland Waters, Environment Canada. For copies of the Great Lakes Charter contact the Great Lakes Commission, The Argus II Building, 400 Fourth St., Ann Arbor, MI 48103-4816, USA. Tel: 313 665 9135, Fax: 313 665 4370, Email: glc@great-lakes.net.



New hope for the 'Hungarian Sea'

TAMÁS RÉVÉSZ, ALL PHOTOGRAPHS



Left: *Reeds at Tihany, Lake Balaton.*
Right: *This 'vacuum cleaner' dredges a thin layer of highly polluted sediment from sections of the lake.*

The shallow blue waters of Lake Balaton long ago turned murky green through pollution. But scientists' attempts to put matters right were frustrated in the past by political interference and apathy. Now the problem is being tackled afresh. *Anna Várkonyi* **reports.**

Hungary is a landlocked country, but sometimes with a little exaggeration we call Lake Balaton the Hungarian Sea. In my childhood its waters used to be blue. All the Lake region used to be natural, a quiet place with no mass tourism. The colours were bright, the reeds were full of birds. There were no highways or cars, just railways. It was a great experience to arrive from Budapest and see the endless blue water from the train.

You can see how the quality of the water deteriorated if you survey human activities. The beauty of the lake, the picturesque landscape, the lake as a bathing area were all explored at the beginning of the 19th century. The railway from Budapest to Trieste via Nagykanizsa was built along the shore. To regulate the waters a sluice was built on Sió Canal in 1863. This resulted in the disappearance of the Kis-Balaton wetlands, the natural cleaning system of the Zala river before it entered the lake.

Construction of the railway along the southern shore in 1861 gave a major impetus to property development near the sandy beaches, and property values soared. Vigorous development continued in the early decades of the present century, but no comprehensive plan was drawn up. The railway on the northern shore commissioned in 1910, ferry services between the two shores and steadily expanding tourism established closer contacts between formerly isolated communities. Easy access to the Lake attracted more and more visitors and it became the most important resort in Hungary.

Lake Balaton is many things to many people. Winegrowers and connoisseurs knew it as the location of some of the country's best vineyards. Ornithologists draw attention to Balaton as an ideal habitat for many kinds of birds. For holiday-makers, Lake Balaton means a concentration of resorts. Before the political changes the lake was a place where people from the East and West met. On hot summer weekends nearly a million rush toward the Lake and burden the water with sun oil, urine and other organic materials.

Fifty-one species of fish have been identified in Lake Balaton. The commercial catch is about 1,000 tons a year, but the angling as a sport is also very popular, with 230,000 licence holders packing practically every yard of its 200-kilometre shoreline.

István Láng

The first comprehensive development plan for the region was prepared in 1957 by Tibor Farkas, the first of its kind in Hungary. This regional plan, which won international recognition, introduced land use zoning and outlined protective belts with a view to ensuring favourable environmental conditions for lakeside recreation. The planners also indicated an upper limit of 600,000 for the total number of permanent residents, holiday makers and visitors present there at any one time.

This successful first regional plan was discarded wholesale in the 1970s, when the Government determined to develop Balaton as the most significant tourist area of Hungary. But the local government authorities along the Lake lacked political power and financial resources to create the necessary infrastructure such as sewage systems, water supply, and so on. The local government authorities sold zoned lands and protective belts to raise money. The building lots created were so small that a kind of resort slum was the inevitable result.

A multidisciplinary rescue effort was launched under the auspices of the Hungarian Academy of Sciences in order to save Hungary's most important tourist attraction and an important aspect of the country's heritage. Unfortunately there was no collaboration between regional planners and other experts.

István Láng, former general secretary of the Hungarian Academy of Sciences and now the chairman of the advisory committee of the present Minister of Environment explains:

"The first signs of man-made eutrophication in Lake Balaton were recognized as early as the mid 1940s. The Hungarian public only became aware of the danger much later, in the 1970s, following two major fish kills in 1965 and 1975. In 1976 the Co-ordinating Council of Environmental Research on Lake Balaton (CCER) was founded to make recommendations for action at both national and regional levels. "In 1978 IIASA, the International Institute for Applied System Analysis, in Laxenburg, Austria supported by the scientific organizations of 17 countries, started a research project on the eutrophication of shallow lakes focusing on Lake Balaton as a case study. IIASA signed an agreement with CCER to carry out a four-year research programme to deal with both scientific and practical problems. In fact, this was the first time that the abundant information available on Lake Balaton was collected, processed and classified according to its importance."

The fundamental cause of eutrophication was an increase in the discharge of phosphorus into the Lake, 60-70 per cent of which is associated with solid particles. Phosphorus removal is the most urgent task in all areas, according to Láng, particularly at sewage discharges in the Zala river catchment. ▶

"The drastic change in water quality in 1982 made that year a remarkable one," says Láng. "The annual average and peak values of eutrophication indicators exceeded all records, and a bloom of blue-green algae indicated a breakdown of the aquatic ecosystem. The ultimate goal was to attain and preserve water quality levels that prevailed in the early 1960s, but already at that time the economic situation presented obstacles.

"The new policy was the result of a compromise. It comprised an integrated programme package which included an improvement in hygiene standards: more toilet facilities, biological treatment of wastewater with phosphorus precipitation at the major population centres, sewage diversion systems, sewage treatment facilities, as well as the completion of the first and second stages of the Kis-Balaton pre-reservoir system, the banning of industrialized livestock farms, the dredging of sediment in highly polluted sections of the Lake, and the restriction of the sale of detergents to those of low phosphorus content."

The next five-year plan was handicapped by the political changes. But in fact by 1987 many of the 1982 government guidelines had been achieved. Two-thirds of the sewers have been completed, but the sewage diversion system is still only a plan. The first stage of the Kis-Balaton pre-reservoir has been completed, but the second stage needs further investment. Only two km^2 has been dredged instead of the planned 12 km^2. The protection of the reed belt along the shore was a failure. Furthermore there was additional destruction by unidentified diseases. The limit on tourist accommodation happened spontaneously because of the political changes. The number of livestock farms decreased owing to the economic changes and fertilizer use in the vineyards also fell with privatization.

Lake Balaton is still in danger. According to István Láng: "There are three important measures still needed to save the Lake: a general Balaton Act, a government commissioner who has enough power and responsibility, and a foundation specialized in Balaton problems. If these are achieved, the outlook is hopeful, because the World Bank, the European Bank for Reconstruction and Development, the Austrian and the Swiss Governments have all indicated that they would contribute to the cost of the necessary measures to save Lake Balaton." ■

Anna Várkonyi is a freelance journalist based in Budapest.

Waterway warning

The World Wide Fund for Nature (WWF) has issued a warning that a 3,442-km waterway designed to cross the world's largest wetland in Brazil and connect two major rivers is economically unsound and will devastate the environment.

WWF/KRAMER

The WWF report *Hidrovia Paraguay-Parana: Who pays the bill?* states that five Latin American countries will need up to US$1.3 billion to construct the Hidrovia between now and the year 2015. Over the same period, an additional US$3 billion will be needed for maintenance and operations cost.

"Our analyses indicates that the Hidrovia project is totally unfeasible and will be very expensive in social and economic terms," says Leonardo Lacerda, WWF Programme Officer for Latin America. "The project should not be pushed through."

The Hidrovia will connect the Paraguay and Parana Rivers. Proponents of the project say that it will allow farmers and businessmen in the interiors of Brazil, Argentina, Uruguay, Paraguay and Bolivia to export their products.

The construction of the Hidrovia, due to begin in Summer 1996, would require dredging more than 86.6 billion m^3 of mud, building 32 dikes in several branches of the rivers, and straightening waterways.

It is estimated that in the first year of operation, the 62,000 km^2 Pantanal wetlands will lose 17 billion m^3 of water. This is enough to supply the fresh water needs of nearly 155 million people or the entire population of Brazil.

"This water loss will also change climatic conditions in the Pantanal and with it, a serious loss in terms of wild animals and plants," says Mr Lacerda. The Pantanal is home to about 150,000 known species of plants and animals.

■ *For more information, contact Paulo Lyra at +55 61 248 2899 or Javier Arreaza at +41 22 364 9575. An English summary of the 92-page report is available.*

Sexual health

Just under a year ago, six family planning associations (FPAs) in Africa, Asia and the Caribbean, embarked on a new project aimed at improving sexual health at the community level. Under the general direction of the International Planned Parenthood Federation's Sexual Health Project, these six FPAs are undergoing a subtle but profound change: most particularly in the way their staff and volunteers are approaching the real needs and concerns of people in the communities they serve.

IPPF's member associations in Burkina Faso, Dominican Republic, Gambia, Ghana, India and Tanzania are exploring sexual health in a new way: one which embraces traditional programme areas (such as reproductive health, family planning, sexually transmitted disease control and HIV/AIDS) but also includes an area largely ignored by current programmes – community discussion of concerns around sexuality and human relations.

Such discussion is a starting point for behavioural and

Associates' NEWS

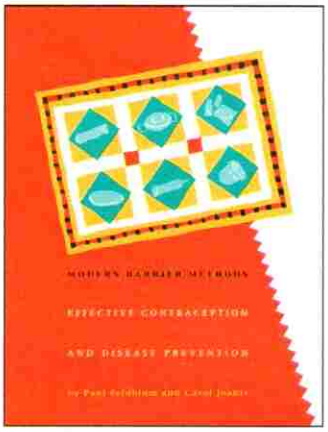
social change. Family planning workers are encouraging groups to *articulate* their concerns and to *identify* the issues which lie behind these: issues that relate inevitably to the social, political and economic environments in which people live, as much as to the services provided.

Implications of this work are far-reaching. IPPF's Sexual Health Project is creating the opportunity for people in marginalized villages and neighbourhoods to take independent, community action to change their lives for the better, as well as to review the FPA service.

■ *For further information contact Tony Klouda or Hilary Hughes at IPPF, Regent's College, Inner Circle, Regent's Park, London NW1 4NS. Tel: +44 171 486-0741, Fax: 487-7950.*

Barrier methods

In an effort to provide information on contraceptive methods that will also protect against sexually transmitted infections, Family Health International has recently published a useful guide to barrier contraceptives.



JHU/CCP

Modern Barrier Methods: Effective Contraception and Disease Prevention provides information on safety, effectiveness and acceptability of barrier methods.

Modern Barrier Methods contains instructions on proper use of diaphragms, the contraceptive sponge, male and female condoms, cervical caps and spermicides, and on the advantages and disadvantages of each method.

Copies are available at no cost to developing country institutions and individuals, upon written request, with brief explanation of need. US and European orders are $13.95 per copy, which includes postage and handling.

■ *For mail orders contact: Publications Co-ordinator, FHI, PO Box 13950, Research Triangle Park, NC 27709, USA.*

Gender inequalities

Inequality between men and women has direct, demographic consequences in diverse societies. This is the central finding of a series of reports on gender inequalities and demographic behaviour in Egypt, India and Ghana/Kenya, published by the Population Council.

"Gender inequalities in families, mirrored in other levels of society, are profound in all these countries and play an important role in reproductive decision-making and demographic change," says Dr Cynthia B Lloyd, Population Council senior associate, director of social science research and co-author of the Egypt report.

Egypt, India, Kenya and Ghana were selected for analysis because they are populous countries whose cultures and rates of fertility transition differ significantly. Gender inequality manifests in different ways and to varying degrees in the four countries at the level of family; legal, economic, and educational systems; family planning and reproductive health services; and the health care system in general. These differences may contribute to the countries' differing rates of demographic change.

The "Gender Inequalities and Demographic Behaviour" series is one component of a four-year project funded by the United Nations Population Fund (UNFPA), titled "The Family and Population Policy: Towards the Realization of Full Reproductive Choice," directed by Dr Lloyd. The long-range goal of this project is to help governments design and implement policies that achieve population goals – particularly the promotion of full reproductive choice – in ways that are affirmative of women and sensitive to the family.

■ *Free single copies of the Egypt (limited supply), India, Ghana/Kenya studies can be obtained from the Population Council's Circulation Department in New York City. Tel: +1 212 339 0514, Fax: 212 775 6052.*

Quality care

The Association for Safe and Voluntary Contraception International (AVSC) has recently published a working paper *Quality Management for Family Planning Services: Practical Experience from Africa*. The paper summarizes their experience over the past decade of working with family planning providers in Sub-Saharan Africa to improve the quality of services.

Joseph Dwyer and Terrence Jezowski, authors of the paper, review the obstacles that have been encountered and describe some strategies that have yielded success.

In Africa, as in other parts of the world, family planning services are often isolated and fragmented. Staff training is inappropriate or unsupported. Clinics have not yet been prepared to change as their base grows. Providers are often not as respectful or sensitive to clients as they might be. Quality itself is an abstraction that needs clarification. Of all the obstacles, the authors note that "one of the biggest impediments to quality services is the lack of attention to supervision."

■ *The working paper is available from the Material Resources Department, AVSC International, 70 Madison Avenue, New York, NY 10016, USA. Tel: +1 212 561 8000, fax: 212 779 9439.*

Family drama

Question: What do the names *Akauma Nechekuchera, Koneweka, Family Affair, Ezi Na Uno, Ezindu, Zinduka, and Kwelewana Ni Kuzungumza* have in common?

Answer: They are all titles of popular radio social dramas

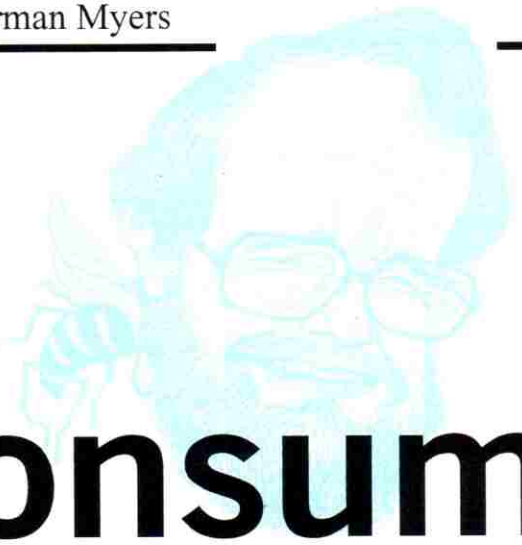
that promote family planning and reproductive health measures in Africa.

"Who is your main character?" "How does she change during the story?" "What will make people want to listen to the next episode?"

These and other questions flew through the air during a lively two-week symposium on radio serial drama in Africa in November 1994. The Zimbabwe National Family Planning Council and the Johns Hopkins Population Communication Services Project co-hosted this spirited, entertaining and educational workshop.

Some 30 participants from 14 countries shared their experiences in this new field of development communication. They agreed to establish a network for African radio serial drama and to plan for more specific training in scriptwriting.

Associates' News is compiled by Maya Pastakia to whom all contributions should be addressed.



Consuming less

This magazine's recent report on *A World of Waste* made one thing clear: Unless we curb excessive consumerism, we cannot hope to solve the population/environment problem.

The sheer upsurge in human numbers and our expanding technological muscle are partly to blame. So is the world's ever-increasing appetite for material goodies. As a result, in the period 1950-1990 we chewed up more raw materials than all our forebears put together.

Yet many will react: "Are we really going to ask people to reduce their consumption after we have spent 10,000 years in trying to consume more?" Doesn't the idea go against the very grain of human nature? Sure it does. But the alternative is equally sure, that environmental factors (run-down of resources, waste and pollution) will eventually do the job for us. So let's avail ourselves of what is even more part of human nature insofar as it makes us distinctively different from all other creatures, and exercise our power to choose.

Of course our choosing is strongly influenced by advertising. According to the Worldwatch Institute, global spending in this sector is growing three times faster than population, and between 1950 and 1990 it expanded seven-fold to top one quarter of a trillion dollars (more than the developing world spends on education and health). What if we could somehow harness the powers of the advertising coterie in support of the cause? The current publicity campaign for increased energy efficiency and conservation is a prime example of how to do more with less.

Energy efficiency demonstrates that curbing our consumption need not mean endless sacrifice and a hair-shirt lifestyle. On the contrary, it can go far to enhance our environmental quality of life and help our economies at the same time. So right on and write on for those advertising copy scribes who send out messages to change our consumerist habits. Think of the potential in other aspects of our daily rounds. For instance, a full quarter of the food we purchase is either left to rot in the fridge or is thrown away off our plates. No horrendous sacrifice required on that front.

Much the same applies to excessive packaging. Americans spend a whopping $225 per person per year on packaging. Thrown-out packaging in the United States, as in other rich nations including Britain, makes up nearly half of municipal solid waste. Does all that packaging make an overall contribution to our welfare? Or does it rather detract from our long-term felicity on this Earth? To cite Alan Durning*, tomatoes and green peppers that last a week are sold in foam containers and plastic trays that last a century.

Fortunately German manufacturers now have to collect and re-use or recycle most packaging materials, along with large consumer goods such as home appliances and cars. And there are some bright stars in the American firmament. The city of Seattle recycles 40 per cent of its solid waste, more than any other large US city.

This is a far cry of course from purchasing fewer goods, whether packaged or not. Certainly we need to confront that momentous challenge over the long haul. Given the consumption of Americans compared with the global average, the "real world" population of the United States can be reckoned to be 22 billion. Fortunately there is much kilometrage too in altering our purchasing preferences. What if we were to forego that second car and spend savings on CDs, concerts, sports, photography and personal computers, none of which gobbles up great gobs of raw materials or is polluting in use? In particular, electronics technology offers much scope for enriched lifestyles – and all the microchips in the world would fit inside a single jumbo-jet.

What ultimately counts is our welfare. While not everyone can define precisely what that means, many people can tell you whether they have it or not. The share of Americans describing themselves as "very happy" was only about one-third in 1957, and despite a two-fold increase since then in per-capita spending for personal consumption, the happiness quotient has hardly varied. The reason could lie with the misleading messages promulgated by the marketplace. According to the New Economics Foundation in London, gains in Britons' personal income are increasingly cancelled out by social and environmental damage. The costs of pollution alone are reckoned to be more than £22 billion, or 6 per cent of GNP.

The consumption revolution ahead will amount to a profound shift in our lifestyles. It is certain to arrive sooner or later, whether by design or by default. We simply cannot continue with our present unbridled bonanza. Do we need to anyway? Many of us enjoy material affluence that would rival that of a Croesus. And the most profound advances in human behaviour are certainly within our capacities. Since 1980, a full 55 million Americans have given up smoking: a social earthquake.

Glorious revolution, here we come! ■

Norman Myers is a WWF gold medallist, author and consultant on environmental issues.

*Alan T. Durning, *How much is Enough: The Consumer Society and the Future of the Earth*, Earthscan, London, 1992.

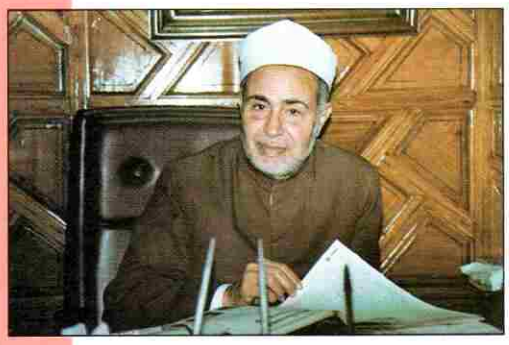
FILMS

An overdue debt to women

"The Cairo Conference on Population and Development was crucial. It paid a long overdue debt to women, to look at family planning programmes not from a demographic point of view alone or as state policy, but from the point of view of the individual woman."

The speaker is Dr Maria Isabel Plata, Director of Profamilia, the IPPF affiliate in Colombia.

She is speaking on the first *People & Planet Video*: a half-hour programme on reproductive health and the Cairo Programme of Action, to be distributed worldwide through the Television Trust for the Environment.



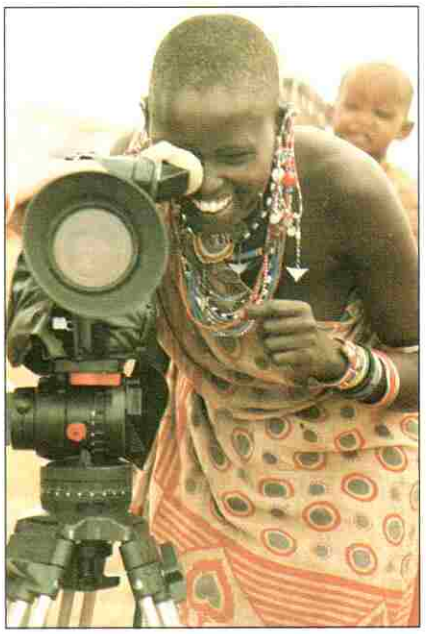
The video homes in on Egypt and Colombia to show how one government programme and one non-government organization are moving in the direction spelt out in the Cairo Programme of Action.

In Egypt, a programme born out of concern for the pressure of population on a very limited resource base has gone a long way to focus its activities on women's reproductive health.

It is a position defended by Dr Mohammed Said Tantawee, The Grand Mufti, Head of the Islamic Church in Egypt, who stresses in the film the importance of family planning as something to be weighed up by the husband and wife together:

"Whether for health reasons, or for social reasons, or economic reasons, once there is agreement between two partners, Islamic law has no objection to family planning."

Dr Fred Sai, who chaired the Cairo Conference, goes further in emphasizing the concern with the personal needs and development of women:



"Women are not just objects in this game. Women are equal partners with men in the total reproductive health field. And just because they produce children biologically they should not be forced or seduced into not having too many children. There are other ways of meeting their needs and fertility aspirations.

"We want to make health care delivery systems look at women's health as a major area of concern in a way that has not been done before, largely because women have not had the power to make their problems known."

It is a message echoed in the film by the voices of village women in Egypt and Colombia, where Profamilia's services are organized around the individual needs of women, men and young people.

The video, entitled *Victory for Women*, includes highlights of the Cairo Plan of Action and is available in English, French and Spanish versions, with African, Asian and Latin American presenters.

It is the first of a quarterly series of half-hour documentaries jointly developed by Planet 21 in association with North South Productions, the Television Trust for the Environment and the International and the Institute for Environment and Development, with funding support from DANIDA, UNFPA, the European Union and the World Bank.

■ *For more information contact Planet 21 or North South Productions at 1 Woburn Walk, London WC1H 0JJ, UK. Tel: +44 171 383 4388/388 0351, Fax: 388 2398. To obtain copies of the videos contact TVE, Prince Albert Road, London NW1 4RZ, UK. Tel: +44 171 586 5526, Fax: 586 4866.*

Planet online

A selection of feature articles from *People & the Planet*, including our nine-page report from the Cairo Conference on Population and Development, can now be accessed on the global Internet computer network.

This is thanks to a new Internet site in London, called *One World Online*, designed as standing conference on global development issues.

This initiative is the brainchild of Peter Armstrong, former BBC producer who went on to become chair of the Muti Media Corporation and was recently appointed Director of the British-based One World Broadcasting Trust.

"It's a collaborative effort", says Armstrong. "With materials being sent by many development agencies, we are hoping to provide a dynamic meeting place on the Internet where NGOs and broadcasters can exchange important ideas." Key partners include the BBC's Networking Club, the One World Group of Broadcasters and the British Overseas Development Administration.

More than 25 million people are now estimated to have access to the Internet.

Unlike some networks, *One World Online* is highly visual, capable of transmitting full-colour pictures, maps, cartoons and graphs as well as text. Special features include news reports, overviews of key themes, features on development in action, critics choice of radio and video productions, a one world gallery of photographs, new publications and conference reports.

■ *Readers with access to the World Wide Web pages of the Internet can log on to One World Online via the BBC Networking Club's web site (http://www.bbcnc.org.uk). Or contact One World Broadcasting Trust, Hedgerley Wood, Red Lane, Chinnor Oxon OX9 4BW, UK. Fax: +44 1494 481751, Email: oneworld@bbcnc.org.uk.*

Videos wanted

Media for Development Trust (MFD), a Zimbabwean charity, is seeking donations to expand its collection of development-related videos for use in their Video Resource Centre.

■ *To donate educational films or videos to MFD, contact Ben Zulu at MFD, PO Box 6755, 135 Union Avenue, Harare, Zimbabwe. Tel: +263 4 733364/5, fax: 729066. Or Christine Schlegel at MDFI, 9111 Guilford Road, Columbia, MD 21046, USA. Tel: +1 301 490 4465, Fax: 490 4146.*

BOOKS

Waiting for the penny to drop

State of the World 1995
Lester Brown and others
W W Norton and Earthscan, 1995.
US$11.95, Can.$15.99, £12.95

Looking back over the row of *State of the World* reports, since the first in 1984, one is struck by the consistency of the message – and its increasing relevance. Unfortunately, the slowness of the political response is equally striking.

Worldwatch was warning in the 1980s that "by the end of next decade, the die will pretty well be cast." We would either have rallied and turned back the threatening trends, or environmental deterioration and social disintegration would be feeding on each other.

Now, here in the middle of that "next decade", Worldwatch concludes that the policy response remains "seriously inadequate... If complacency reigns and international forums generate lots of talk and paper but little action, the future does not look bright."

The 1995 report is notable both for the explicit examples it provides of social and economic stress associated with destruction of the earth's natural systems, and for its specific policy recommendations to create a climate in which remedial actions can begin to take effect.

It points especially to the overharvesting of fisheries, the overcutting of forests and the overpumping of aquifers as factors which are destroying the planet's resource base and swelling the ranks of the unemployed.

Lester Brown cites the example of Côte d'Ivoire, where "the forest products export industry that once fuelled the economy has almost disappeared." Nigeria and the Philippines are two other countries where clear cutting has destroyed the timber industry.

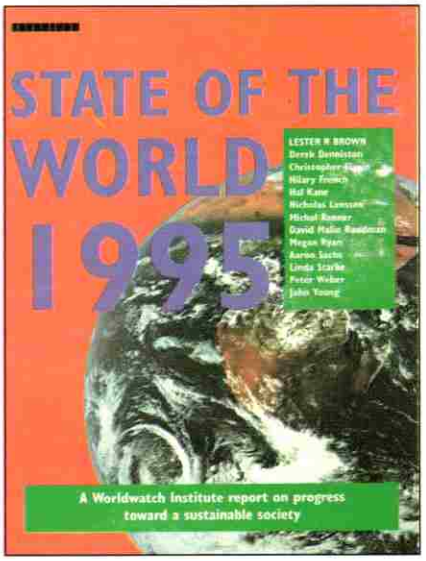
The decimation of the sturgeon harvest in the Caspian Sea and the sevenfold fall in the fish catch from the Black Sea, both highlighted in this magazine, are given as examples of the damage now being suffered by the world's fisheries. Seafood, once a cheap source of protein, costing in 1960 only half the price of beef, is now the more expensive food.

All the ocean fisheries are in decline, some desperately so: "The cod and haddock fishery off Canada's Newfoundland coast has collapsed, crippling the provincial economy and leaving 33,000 people unemployed."

A growing number of countries are also affected by water scarcity, with underground water supplies being overpumped in key farming regions such as northern India where the water table is falling by one metre a year. Chinese farmers in the farmlands around Beijing are no longer allowed to use the water from reservoirs in the region, so big is the demand from the growing city.

While the ecological symptoms of our unsustainable ways include shrinking forests, thinning soils, falling aquifers, collapsing fisheries and expanding deserts, the economic and social symptoms are also apparent, says the report. They include falling incomes, rising unemployment, loss of investor confidence, hunger, environmental refugees and conflict.

Specific policy recommendations, in a final chapter by Hilary French, include upgrading the UN Environment Programme or creating a new Global Environmental Organization. She would welcome a dedicated funding source for environmental and social spending – possibly from a tax on foreign exchange transactions – and pursuit of the UN Development Programme's 20/20 Compact for social spending, as set out by Gus Speth in *People & the Planet*.



She would also like to see the world moving quickly "to strengthen and implement the hundreds of international environmental agreements that now exist, putting Agenda 21 and the World Population Plan into practice, and fully opening all parts of the vast United Nations system to public participation."

Let's hope that some progress is made in these directions before the millennium edition of *State of the World* is upon us.

John Rowley

Reproduction and the environment

Umwelt und Fertilität (Environment and Fertility)
Jürgen Heinrichs
LIT Verlag, Hamburg, 1994

This useful little book is subtitled 'Introduction to aspects of sexual ecology', and the author, former President of the German FPA, Profamilia, and former Chairman of the IPPF Central Council, explains in Chapter 2 what he means by *Sexualökologie*, a concept he coined himself.

Human reproduction affects the environment through population pressure on the land and resources, and environmental deterioration can affect human reproduction. But Jürgen Heinrichs' aim in this book is to correct the simplistic representation of this two-way process, namely that it is only excessive reproduction in developing countries which causes ecological damage, while only environmental pollution in the industrialized countries is responsible for the low birth rates there. He examines the real motives of couples in some developing countries for having large families, discusses both voluntary and involuntary childlessness in the rich countries, and the effects on human reproduction and sexual relationship, in both North and South, of pesticides, air and water pollution, electromagnetic radiation and heavy metals.

Illustrated with press cuttings from various countries, the book is at present only available in German and Polish.

Jeremy Hamand

Rainforest riches

The High Frontier: Exploring the Tropical Rain Forest Canopy
Mark W Moffett
Harvard University Press, 1994, paperback $24.95

Research on the tropical rainforest canopy is only 20 years old but it is changing fundamental concepts about rainforests, plant and animal evolution, and ecosystems.

This gorgeously illustrated book with 40 full pages of colour illustrations and many more smaller photos comes with a lucid text. Author Mark Moffett is a biologist and nature photographer who visited 17 research sites around the world and interviewed in-depth 30 tropical rainforest canopy scientists.

Perhaps most spectacular of all in a spectacular volume is the discussion of the advance in technologies over two decades that have made canopy research possible. Starting with tree climbing by ropes shot by arrows to heights 100-150 feet above the rainforest floor, scientists have improvised ladders, walkways, booms, platforms, cherry pickers, cranes and most recently dirigibles from which sleds are lowered.

This is a magnificent survey of what is known and not known about tropical rainforest canopies, a world even richer and more diverse than ground level. It covers canopy plants, animals, trees, insects, birds and their interactions in a combination of first-person and comprehensible science journalism.

Aaron Segal

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